



**MATA TRIPURA SUNDARI  
OPEN UNIVERSITY**

**Tripura**

**ECM-6111**

**SCHOOL OF HUMANITIES  
AND SOCIAL SCIENCES**

**Microeconomics- I**

**MASTER OF ARTS  
(ECONOMICS)**

**Course Name: Microeconomics- I**  
**Course Code: ECM-6111**



# **MASTER OF ARTS (ECONOMICS)**

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# **BLOCK I: DEMAND ANALYSIS AND CONSUMER BEHAVIOUR**

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## **UNIT 1: UTILITY AND INDIFFERENCE CURVE ANALYSIS**

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### **STRUCTURE**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Utility Analysis
  - 1.3.1 Meaning and Concept of Utility
  - 1.3.2 Total Utility (TU)
  - 1.3.3 Marginal Utility (MU)
  - 1.3.4 Law of Diminishing Marginal Utility
- 1.4 Indifference Curve Analysis
  - 1.4.1 Meaning and Concept
  - 1.4.2 Characteristics of Indifference Curves
  - 1.4.3 Indifference Map
- 1.5 Marginal Rate of Substitution (MRS)
- 1.6 Summary
- 1.7 Glossary
- 1.8 Exercises
- 1.9 Suggested Readings

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### **1.1 INTRODUCTION**

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The study of microeconomics is crucial for understanding how individual consumers and firms behave in the marketplace. Unit-1, titled "Utility and Indifference Curve Analysis," explores two key methods for analyzing consumer decision-making: Utility Analysis and Indifference Curve Analysis. These approaches help explain how individuals make choices to maximize their satisfaction, or utility, from consuming goods and services. Utility, a subjective measure of satisfaction, is examined through the concepts of total utility and marginal utility, with the Law of

Diminishing Marginal Utility stating that as consumption increases, the additional satisfaction from each extra unit declines. In contrast, Indifference Curve Analysis visually represents consumer preferences, where indifference curves illustrate different combinations of two goods that provide equal satisfaction, and the budget constraint reflects financial limitations. The Marginal Rate of Substitution (MRS) indicates the rate at which a consumer is willing to exchange one good for another while maintaining the same overall utility, and consumer equilibrium is achieved where the budget line is tangent to an indifference curve, representing the optimal choice of goods. By integrating these concepts, this unit provides a comprehensive understanding of consumer behavior, forming a foundation for advanced economic studies. Through graphical representations and theoretical insights, learners gain a deeper perspective on how consumers allocate resources and make consumption choices, a fundamental aspect of microeconomic theory.

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## **1.2 OBJECTIVES**

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After completing this unit, you should be able to:

1. Describe and elucidate the usefulness idea.
2. Recognize the distinctions between marginal and total usefulness.
3. Give instances to illustrate the Law of Diminishing Marginal Utility.
4. Describe and analyze maps and indifference curves.
5. Gain an understanding of the Marginal Rate of Substitution (MRS) concept.

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## **1.3 UTILITY ANALYSIS**

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### **1.3.1 Meaning and Concept of Utility**

Utility is the satisfying power of a commodity. It is a measure of the satisfaction that the consumer expects to obtain from consumption of goods and services when he spends money on a stock of commodity

which has the capacity to satisfy his want. Utility is a subjective and relative concept that varies from person to person. From an economic standpoint, people may find utility in even harmful things like liquor because they desire them. Thus, in economics, the concept of utility is ethically neutral.

The notion of utility has undergone changes throughout the development of economic literature. Alfred Marshall saw usefulness as tangible and quantifiable, namely on a cardinal scale. It was his belief that a cardinal number called 'util' might be used to quantify the pleasure a client receives from consuming a unit of a product. However, the issue with this strategy was the lack of a suitable measuring index that could provide a cardinal number. Is 1 util for customer A comparable to 1 util for consumer B? Does raising utility from 1 to 2 utils imply a doubling of the utility achieved? These are some of the unresolved questions in the cardinal method. The ordinal technique developed by J.R. Hicks, which does not rely on specific units of measurement, effectively addressed these issues via the use of ranking and preference-ordering of bundles. Based on this methodology, it is possible to categorize certain bundles as 'superior', 'inferior', or 'equivalent', without making any statements regarding the intensity of the preferences.

A key idea in microeconomics is utility, which describes the contentment or enjoyment people have from using products and services. It is a subjective metric that differs depending on the individual's interests and preferences. In order to study consumer behaviour and decision-making processes, economists use utility to measure the pleasure derived from various consumption bundles.

#### **Utility function and preferences:**

Based on the number of items consumed, a utility function (U) measures the level of consumer pleasure attained. The following format is used to express the function:

$$U_1 = (X, Y)$$

X and Y denote the quantity of commodities consumed by the customer, whereas  $U$  represents the utility level, which is a numerical measure generated from eating this combination of commodities. Utility functions may be derived from preferences, meaning that preferences can be accurately represented by utility functions. The function  $U$  distributes values to distinct bundles in a manner that accurately represents the consumer's choices.

$$U(A) \geq U(B) \text{ if and only if } A \geq B$$

Here,  $A$  and  $B$  represent collections of commodities  $X$  and  $Y$ .

As seen from the statement above, the utility function maintains the preference connection among the bundles. In other words, if a consumer has a little preference for bundle  $A$  over bundle  $B$ , the utility derived from consuming bundle  $A$  will not be lower than the value derived from consuming bundle  $B$ . In order to reflect preference ordering, a utility function must satisfy the conditions of completeness, transitivity, reflexivity, and continuity. Continuity refers to the absence of abrupt changes in the preference relation. In other words, if bundle  $A$  is strictly preferred to bundle  $B$ , then bundles that are similar to  $A$  are likewise preferred to  $B$ .

Keep in mind that utility functions assign values based on their relative order, not their actual numerical difference. In other words, only the ranking of the numbers is important, not the specific values themselves. A utility function  $U$  represents preferences for bundles  $A$ ,  $B$ , and  $C$  by assigning utility values, so that  $U(A) = 1$ ,  $U(B) = 2$ , and  $U(C) = 3$ . These preferences will remain the same provided.

The utility values for options  $A$ ,  $B$ , and  $C$  would be  $U(A) = 1$ ,  $U(B) = 1.5$ , and  $U(C) = 2$ , respectively. This suggests that identical preferences may be expressed via many utility functions. Two utility functions that describe the same preferences and their relationship:

Given two utility functions,  $U$  and  $V$ . The two will have the same preference only if there is a strictly growing function  $F$  that represents them both.

$$V = F(U), \text{ such that } F'(U) > 0$$

For example, if we define  $V$  as the sum of  $U$  and  $C$ , where  $C$  is any constant, then  $V(A)$  is strictly preferred to  $V(B)$  if and only if  $U(A)$  is strictly preferred to  $U(B)$ , if and only if  $A$  is strictly preferred to  $B$ . Function  $V$  is defined as any modification of function  $U$  that preserves the preference ordering representation. These kinds of changes are referred to as monotonic transformations. Therefore, if a utility function accurately reflects a consumer's preferences, every monotonic transformation of that utility function will yield another utility function that also accurately expresses the same preferences.

### 1.3.2 Total Utility (TU)

Total Utility (TU) represents the total amount of satisfaction or pleasure that a consumer receives from consuming a given quantity of goods or services. It is the cumulative sum of the utility gained from each unit consumed. A consumer's overall utility usually rises when they consume more units of an item, however the rate of growth may differ.

In mathematics, the total utility may be written as follows if  $U(x)$  is the utility obtained by consuming  $x$  units of an item:

$$TU = \sum_{i=1}^x MU(i)$$

- It is sum of marginal utilities derived from consumption of different units; i.e.
- $TU = MU_1 + MU_2 + MU_3 + \dots + MU_n$ .  
Here,  $MU_1, MU_2, MU_3, \dots, MU_n$  are marginal utilities of successive units of a commodity.

### 1.3.3 Marginal Utility (MU)

**Marginal Utility (MU)** refers to the extra satisfaction or benefit a consumer derives from consuming an additional unit of a good or service. It represents the change in total utility resulting from a one-unit increase in consumption. Marginal utility is essential in understanding how each successive unit of a good influences a consumer's overall level of satisfaction.

Mathematically, marginal utility is the derivative of total utility with respect to the quantity of the good:

Marginal utility can be mathematically expressed as the derivative of the total utility function with respect to the quantity of the good consumed. If TU represents total utility and Q represents the quantity of the good, then:

$$MU = \frac{\Delta TU}{\Delta Q}$$

In calculus terms:

$$MU = \frac{d(TU)}{d(Q)}$$

### 1.3.4 Law of Diminishing Marginal Utility

#### **Definition of the Law of Diminishing Marginal Utility**

The Law of Diminishing Marginal Utility states that as a consumer continues to consume additional units of a good or service, the extra satisfaction (marginal utility) gained from each successive unit gradually declines. In other words, the first unit provides the highest level of satisfaction, while each following unit contributes less utility,



resulting in a continuous decrease in the additional benefit derived from further consumption.

### Concept of Diminishing Marginal Utility

- Also called 'Fundamental Law of Satisfaction' or 'Fundamental Psychological Law'.
- Law States:  
Law of Diminishing Marginal Utility states that after consuming a certain amount of a goods or service the Marginal Utility from it diminishes as more and more is consumed. When units of other commodities remain constant.

OR

Law of Diminishing MU states the utility of each successive unit goes on diminishing as more and more units of commodity consumed, when units of other commodity remain constant.

### Mathematical Expression

The law of declining marginal utility may be expressed mathematically as follows, where MU is the marginal utility and Q is the amount of the good:

$$\frac{d(MU)}{dQ} < 0$$

This concept illustrates that marginal utility decreases as the quantity (Q) consumed increases. According to the **Law of Diminishing Marginal Utility**, as a consumer consumes more units of a good, the additional satisfaction derived from each successive unit gradually declines. In other words, the marginal utility of each extra unit diminishes as consumption increases. This principle plays a vital role in understanding consumer behavior and demand patterns. For instance, imagine a person eating slices of pizza—the first slice offers significant



satisfaction (high marginal utility), but as they continue eating, each additional slice provides less satisfaction than the one before.

**ASSUMPTIONS:**

1. Rational Behaviour of consumer.
2. Cardinal Measurability of utility. (Utility can be expressed in terms numbers).
3. Utility can be measured by money and MU of money remains constant.
4. Income and Mental Status of consumer is constant.
5. Price of commodity, price of other commodity and other factors which affect utility are assumed to be constant.
6. Standard units of commodity are consumed like a cup of tea and not spoon of tea.
7. Consumption of commodity is continuous not with a gap of day or two.

**Example and Graphical Representation:**

As consumer increases the consumption of any commodity keeping units of other commodity keeping units of other commodity keeping units of other commodities as constant then the satisfaction derived from every additional unit will go on diminishing. (As intensity of desire for a commodity tends to decrease as more and more of units of a commodity are consumed).

After a certain unit, a consumer reaches to a point where utility from additional unit becomes zero. This represents the point of complete satisfaction. If consumer further increases the consumption of commodity, then addition utility derived becomes negative.

#### NOTE: MARGINAL UTILITY OF MONEY

1. It refers to 'worth of a rupee'.
2. Consumer defines it in terms of utility that consumer derives from a standard of goods he can buy with a rupee.
3. Example: 1 Re = Spent to Purchase 100 gm of salt which gives total utility of 4 utils.
4.  $MU_m = 4$  utils.
5. This is a standard reference whenever person is buying any commodity.
6. Buying a unit of 'x' for a Rupee would mean consumer expects 4 utils from consumption of commodity 'x'.

It is explained with the help of an example. In this, the total utility and marginal utility derived is tabulated and we assume other factors constant that affect utility.



### TOTAL AND MARGINAL UTILITY SCHEDULE:

| Quantity of chocolate bar consumed per day | TU (Total Utility) | MU (Marginal Utility) |
|--------------------------------------------|--------------------|-----------------------|
| 1                                          | 20                 | 20                    |
| 2                                          | 34                 | 14                    |
| 3                                          | 45                 | 11                    |
| 4                                          | 50                 | 5                     |
| 5                                          | 50                 | 0                     |
| 6                                          | 46                 | -4                    |

In the above table, we observe that as we increase the quantity consumption, we observe that with the extra units we consume the TU keeps on increasing but the MU that we derive keeps on diminishing. At the unit 5, the consumption does not give us any extra utility and thus the Total utility is same leading to MU as 0. Also, the consumption of the 6<sup>th</sup> unit leads to decrease in Total utility from Rs.50 to Rs. 46 thus reducing the MU from 0 to -4. Thus, we see that the consumption of 6<sup>th</sup> unit leads to discomfort or disutility.

With the above table we can note some important relationship between Total Utility and Marginal Utility:

1. TU rises as long as MU is positive, but at a diminishing rate because of MU diminishing.
2. MU diminishes throughout.
3. When MU is zero, the TU is maximum. It is a satiation point.
4. When MU is negative, TU is diminishing.
5. MU is the rate of change of total utility or it is slope of TU Curve.
6. MU can be positive, zero or negative.

The relationship can be shown diagrammatically as under:

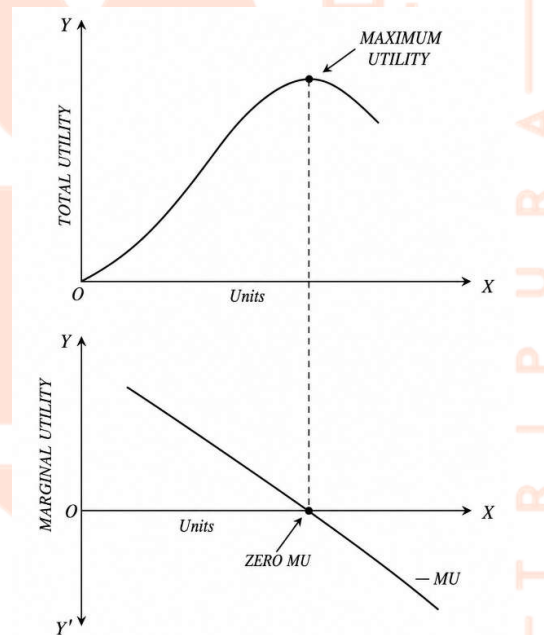


**Fig.1.1 Law of Diminishing Marginal Utility**

**Graphically, this can be represented as**

**1. Total Utility curve:**

- As units consumed increase, total utility rises, but at a decreasing rate (the curve flattens as it climbs).
- It reaches a peak the point of maximum utility where the consumer gets the most satisfaction possible from that good.
- Beyond that point, total utility starts to decline (consuming more actually reduces satisfaction think of eating too much food).

**2. Marginal Utility curve:**

- Marginal utility is the additional satisfaction gained from consuming one more unit.

- MU starts high and continuously falls as more units are consumed this is the Law of Diminishing Marginal Utility.
- At the exact quantity where TU is at its maximum,  $MU = 0$  (zero MU) makes sense, because if adding one more unit contributed nothing extra, total utility would be flat right at that point (the peak).
- Beyond that quantity, MU turns negative (labelled  $-MU$ ), which corresponds to TU actually decreasing.

**The key relationship tying both graphs together:**

| Total Utility     | Marginal Utility      |
|-------------------|-----------------------|
| Rising            | Positive ( $MU > 0$ ) |
| At maximum (peak) | Zero ( $MU = 0$ )     |
| Falling           | Negative ( $MU < 0$ ) |

## 1.4 INDIFFERENCE CURVE ANALYSIS

### 1.4.1 Meaning and Concept

Indifference curve analysis is a fundamental concept in microeconomics that explains consumer preferences and decision-making under constraints. It is based on the idea that individuals gain satisfaction (utility) from different combinations of goods and services. An indifference curve is a graph that shows different combinations of two goods that give a consumer the same level of total satisfaction (utility), such that the consumer is indifferent between any of these combinations they don't prefer one bundle over another

**Indifference Set** – It is set of that combination of two goods which offer the consumer the same

level of satisfaction. So that the consumer is indifferent across any number of combinations in his indifference set.

**Table showing Indifference Set:**

| Combination | No. of Apple | No. of Oranges |
|-------------|--------------|----------------|
| A           | 1            | 10             |
| B           | 2            | 7              |
| C           | 3            | 5              |
| D           | 4            | 4              |

All the above combination i.e. A, B, C, D offer same level of satisfaction to the consumer. They should that consumer is indifferent across all these combinations.

#### **Indifference Curve:**

Indifference curve is locus of all such points which shows different combination of two commodities (Apple and Oranges) yielding the same level of satisfaction to the consumers. It is a diagrammatic presentation of an indifference set of a consumer.

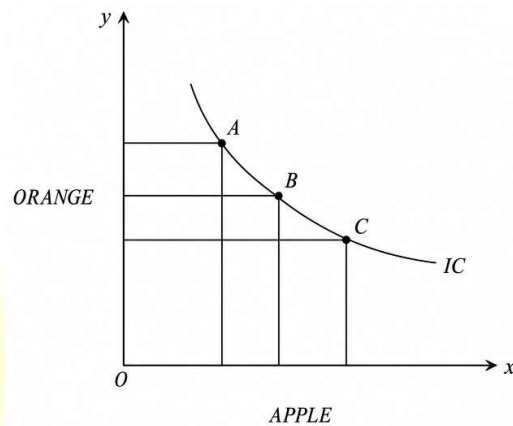


**Fig.1.2 Indifference Curve**

## **ASSUMPTIONS:**

### **1. Rationality**

The consumer is rational and aims to maximize satisfaction (utility) given their income and market prices.

### **2. Ordinal Utility**

Utility cannot be measured in exact numbers (cardinally, like 10 utils, 20 utils). It can only be ranked the consumer can say Bundle A is preferred to, less preferred than, or equal to Bundle B, but not by how much.

### **3. Consistency of Choice (Transitivity)**

Consumer preferences are consistent over time.

If A is preferred to B, and B is preferred to C, then A must be preferred to C ( $A > B > C \rightarrow A > C$ ).

If a consumer prefers A to B today, they won't prefer B to A tomorrow (given the same conditions).

### **4. Non-Satiation (More is Better)**

The consumer always prefers more of a good to less they are never fully satisfied/"saturated." This ensures curves are downward sloping and higher curves represent greater utility.

### **5. Diminishing Marginal Rate of Substitution (MRS)**

As a consumer substitutes one good for another while staying on the same indifference curve, the rate at which they are willing to give up one good for an additional unit of the other diminishes. This is what gives indifference curves their convex shape.

## 6. Two-Commodity World

For simplicity, the analysis usually assumes only two goods (X and Y) are being consumed — this allows the relationship to be shown on a simple two-dimensional graph.

## 7. Perfect Divisibility

Goods X and Y can be consumed/purchased in any fractional quantity (not just whole units).

## 8. Utility Depends on Quantity Consumed

The consumer's satisfaction depends only on the quantities of the two goods consumed, not on other factors (like the consumption pattern of others, habits, or external influences).

### 1.4.2 CHARACTERISTICS OF INDIFFERENCE CURVE:

Indifference curves represent consumer preferences and possess the following important features:

1. **An IC Slopes downward from left to right (negatively sloping):** These curves slope downward from left to right. This reflects that when the quantity of one good decrease, the quantity of the other must increase to maintain the same level of satisfaction or utility.
2. **An IC is Convex to the Origin:** Indifference curves tend to bow inward, or be convex to the origin. This shape demonstrates the law of diminishing marginal rate of substitution (MRS), indicating that as a consumer gives up units of one good, they require increasingly larger amounts of the other good to compensate and maintain the same utility level.
3. **Two IC never intersect each other:** No two indifference curves can cross each other. If they did, it would imply that the same combination of goods yields different levels of satisfaction,



which contradicts the assumption of consistent consumer preferences.

4. **Higher IC represent higher level Satisfaction:** Indifference curves that are situated further from the origin represent higher utility levels. This is because they show combinations where the consumer enjoys more of at least one good, thus achieving greater overall satisfaction.
5. **Each Point Shows a Utility-Equivalent Combination:** Every point on an indifference curve corresponds to a specific combination of two goods that offers the consumer the same degree of satisfaction.

#### 1.4.3. Indifference Map

An indifference map is a collection of indifference curves, each representing a different level of utility. It provides a more comprehensive view of consumer preferences and their choice behaviour.

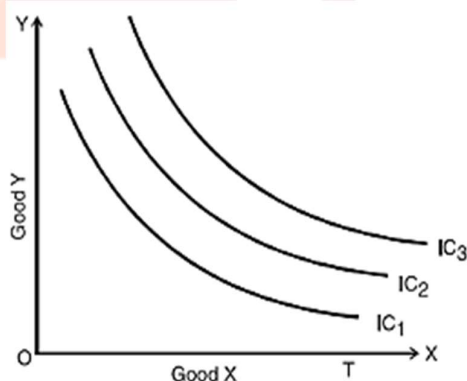


**Fig.1.1 Indifference Map**

**Structure:** An indifference map consists of multiple indifference curves plotted on the same graph. Each curve represents a different utility level, with higher curves indicating higher utility levels.

**A Analytical Tool:** An indifference map serves as a valuable tool for examining consumer preferences. It illustrates different combinations of

goods a consumer is willing to consider. When paired with the budget line—which reflects the combinations of goods a consumer can afford based on their income and prevailing prices—it becomes instrumental in understanding consumer decision-making.

**Consumer Equilibrium:** Consumer equilibrium occurs at the point where the budget line is tangent to the highest attainable indifference curve. This tangency point signifies the most preferred and affordable combination of goods, indicating the consumer's maximum achievable satisfaction within their budget constraints.

#### 1.4.4. PROPERTIES OF INDIFFERENCE CURVE

##### Example and Graphical Representation

To better understand these concepts, let's use a simple example. Suppose a consumer has to choose between two goods: apples and oranges. We plot several indifference curves on a graph where the X-axis represents apples and the Y-axis represents oranges.

**1. Downward Sloping:** IC always slopes downward from left to right i.e. it has a negative slope. It is because if a consumer wants to have more units of one goods, he will have to reduce the number of another goods, if his level of satisfaction remains unchanged. IC slopes downward because of monotonic preference.

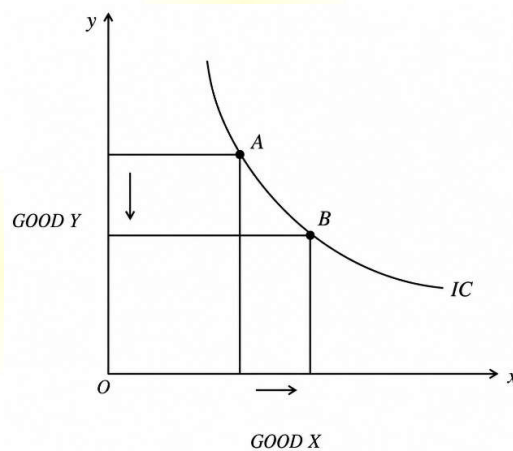


**Fig.1.2. Downward Sloping indifference**

**2. Convex to the Origin:** As the quantity of Good X increases, its MRS or slope of IC goes on diminishing. They show that to gain equal amount of good X, consumer will decline its sacrifice of Good Y. It shows that its MRS between point A and B will be declining as we keep on moving downwards on curve to point C.

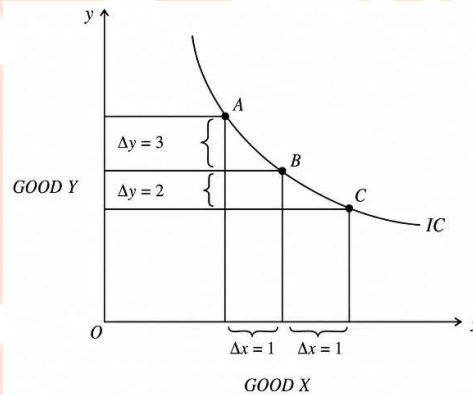


**Fig.1.3. Convex to the Origin**

**3. Every IC to the right represents higher level satisfaction.**

Right side IC gives higher level of satisfaction than the left side IC. This means IC<sub>2</sub> shows higher level of satisfaction than IC<sub>1</sub>. In the above diagram at Point A consumer gets 14 units of Good X and 5 units of Good Y. At Point B consumer gets 16 units of Good X and 5 units of Good Y. Thus, consumer gets 2 more unit of Good X at point B even when amount of Good Y is same as point A.

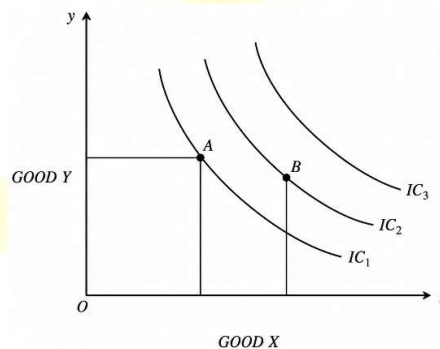


**Fig.1.4. Every IC to the right represents higher level satisfaction**

#### 4. Two IC never intersect each other.

Two IC indicates different level of satisfaction. If we consume that IC1 and IC2 cut each other at point A, then, A & B are on IC1 i.e.  $A=B$  (in terms of satisfaction level). A & C on IC i.e.  $A=C$  (in terms of level of satisfaction). If  $A=B$  and  $A=C$  we can conclude that  $B=C$  but this is not true. We note from the same from the diagram that C is to the right and above B. Therefore, must offer higher level of satisfaction and we can conclude that IC1 & IC1 do not intersect at each other.

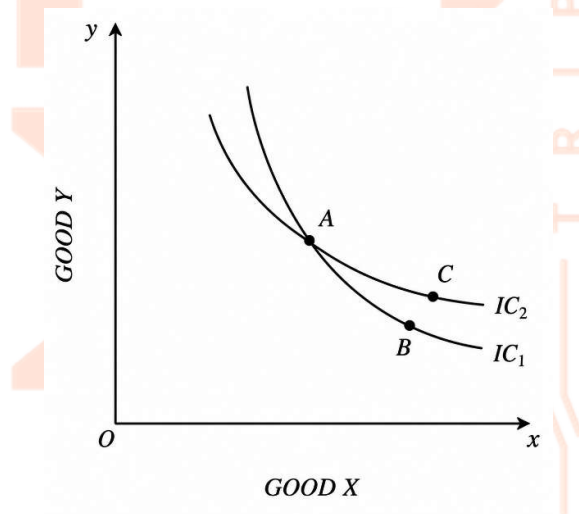


**Fig.1.5. Two IC never intersect each other**

Indifference curve analysis provides a graphical representation of consumer preferences and helps in understanding how consumers make choices under constraints. By examining the properties of indifference curves and the concept of the indifference map, we gain insights into the consumer's decision-making process and how they achieve equilibrium in their consumption. This analysis forms a fundamental part of microeconomic theory and is essential for comprehending various economic phenomena related to consumer behavior.

## CHECK YOUR PROGRESS

1. What is utility? Distinguish between Total Utility and Marginal Utility.

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.....

.....

2. State the Law of Diminishing Marginal Utility with an example.

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## 1.5 MARGINAL RATE OF SUBSTITUTION (MRS)

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### Marginal Rate of Substitution (MRS)

The Marginal Rate of Substitution (MRS) is a key idea in consumer behavior analysis, especially within the framework of indifference curves. It reflects the consumer's willingness to exchange one good for another without altering their overall satisfaction.

**Definition:** MRS indicates how much of one good a consumer is prepared to sacrifice in order to gain an extra unit of another good, while keeping their utility unchanged. It captures the trade-off the consumer is willing to make between two goods.

**Mathematical Interpretation:** MRS is represented by the slope of the indifference curve at a particular point. If the utility function is denoted by  $U$ , and the two goods are  $X$  and  $Y$ , then the MRS of good  $X$  for good  $Y$  is expressed as:

$$MRS_{XY} = \frac{DY}{DX} = \frac{MU_X}{MU_Y}$$

Where  $MU_X$  and  $MU_Y$  are the marginal utilities of  $X$  and  $Y$  respectively.

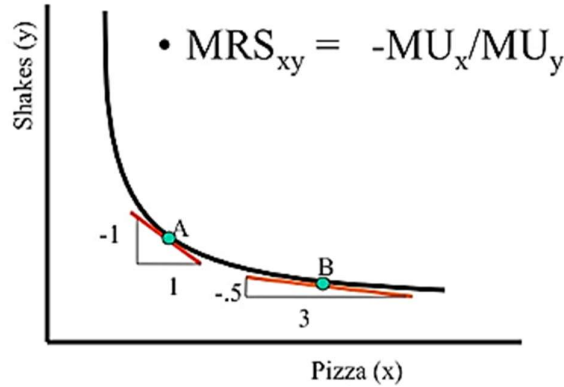


**Fig. 1.5 Marginal rate of substitution**

**Diminishing MRS:** In most cases, the Marginal Rate of Substitution decreases as a consumer continues to replace one good with another. This reflects the principle of diminishing MRS, which suggests that as a person consumes more of one good, their willingness to sacrifice units of another good to obtain additional units of the first good declines.

### 1.5.1 Budget Constraint

The budget constraint illustrates all the possible combinations of goods and services a consumer can afford, based on their income and the market prices of those items.

**Definition:** The budget constraint is typically expressed with the following equation:

$$(P_1 \times Q_1) + (P_2 \times Q_2) = M$$

Here:

- $P_1$  and  $P_2$  stand for the prices of the two goods,
- $Q_1$  and  $Q_2$  represent the quantities of those goods,
- $M$  is the total income available to the consumer.

Alternatively, using goods X and Y, the equation becomes:

$$P_X \cdot X + P_Y \cdot Y = M$$

This equation helps determine the affordable consumption choices a consumer can make within their income limits.

**Budget Line:** The budget line is a graphical representation of the budget constraint, showing all the combinations of goods X and Y that can be purchased with a given budget. The equation of the budget line is:

$$P_X X + P_Y Y = M$$

The slope of the budget line is given by:

$$\text{Slope} = -\frac{P_X}{P_Y}$$

**Shifts in Budget Line:** Changes in income or prices shift the budget line. An increase in income shifts the budget line outward (parallel shift), while a change in the price of one good rotates the budget line.

### 1.5.2 Consumer Equilibrium

Consumer equilibrium occurs at the point where the highest indifference curve touches the budget line. At this point, the consumer maximizes their utility given their budget constraint.

#### Detailed Explanation

- **Equilibrium Condition:** At equilibrium, the slope of the indifference curve (MRS) is equal to the slope of the budget line. Mathematically:

$$\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

Or

$$MRS_{XY} = \frac{P_X}{P_Y}$$

**Utility Maximization:** The consumer allocates their income in such a way that the marginal utility per dollar spent on each good is equal. This ensures the highest level of satisfaction given the budget constraint.

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## 1.6 SUMMARY

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Unit 1, "Utility and Indifference Curve Analysis," delves into the fundamental concepts of consumer behavior and choice in economics. It begins with the concept of utility, explaining how consumers derive satisfaction from goods and services, and introduces the utility function as a tool for measuring this satisfaction. The unit then explores indifference curve analysis, illustrating how consumers make choices between different bundles of goods that provide the same level of utility. The shapes and properties of indifference curves, such as convexity and the marginal rate of substitution, are examined in detail. Budget constraints are also analyzed, showing how income and prices limit consumer choices. By combining indifference curves with budget constraints, the unit demonstrates how consumers achieve equilibrium and maximize utility. Through this analysis, learners gain a comprehensive understanding of the decision-making processes that underlie consumer behaviour, providing a foundation for more advanced economic theories and applications.

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## 1.7 GLOSSARY

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- **Utility:** It is want satisfying power of a commodity.
- **Total Utility (TU):** It is sum of utility derived from different units of a commodity consumed by a consumer.
- **Marginal Utility (MU):** It is the change of total utility generated by consuming one additional unit of that goods or service.
- **Law of Diminishing Marginal Utility:** Law of Diminishing Marginal Utility states that after consuming a certain amount of a goods or service the Marginal Utility from it diminishes as more and more is consumed. When units of other commodities remain constant
- **Indifference Curve:** Graph showing combinations of goods providing equal satisfaction.



- **Marginal Rate of Substitution (MRS):** Rate of substituting one goods for another while maintaining the same utility.
- **Budget Constraint:** Line showing affordable combinations of goods given income and prices.
- **Consumer Equilibrium:** Optimal combination of goods where budget line is tangent to an indifference curve.

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## 1.8 EXERCISES

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1. Define utility and explain its significance in microeconomics.

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2. What is the Law of Diminishing Marginal Utility? Provide an example.

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3. Describe the characteristics of indifference curves.

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4. Explain the concept of the Marginal Rate of Substitution (MRS).

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5. How does a budget constraint affect consumer choices?

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## 1.9 SUGGESTED READINGS

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1. Varian, H. R. (2010). Intermediate Microeconomics: A Modern Approach. W.W. Norton & Company.
2. Samuelson, P. A., & Nordhaus, W. D. (2010). Economics. McGraw-Hill Education.
3. Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics. Pearson Education.
4. <https://tutorstips.com/difference-between-utility-analysis-and-indifference-curve-analysis/>
5. <https://www.toppr.com/ask/question/kkxxkjcjf/>

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## UNIT 2: PRICE AND INCOME EFFECTS, SUBSTITUTION EFFECTS, AND SLUTSKY THEOREM

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### STRUCTURE

- 2.1 Introduction
- 2.2 Objectives
- 2.3 The Price Effect
- 2.4 Income Effects
- 2.5 Substitution Effects
- 2.6 Slutsky Theorem
- 2.7 Summary
- 2.8 Glossary
- 2.9 Exercises
- 2.10 Suggested Readings

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### 2.1 INTRODUCTION

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This unit focuses on the essential concepts of the price effect, income effect, and substitution effect—key elements for analyzing how consumers respond to variations in prices and income. A significant part of the discussion centers around the **Slutsky Theorem**, which breaks down the overall impact of a price change into two distinct parts: the substitution effect and the income effect. This decomposition provides a clear and structured approach to understanding consumer behavior. By using both graphical illustrations and mathematical tools, the unit offers

a solid foundation for comprehending the decision-making process of consumers within the framework of microeconomic theory.

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## 2.2 OBJECTIVES

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After studying this unit, you will be able to:

1. Understand how variations in the prices of goods and changes in income levels affect consumer demand and purchasing behavior.
2. Examine the influence of relative price changes between goods on consumer preferences and decision-making.
3. Apply mathematical and graphical tools to break down the total impact of a price change into substitution and income effects.
4. Develop a clear understanding of rational consumer choices by considering the interplay of price shifts, income changes, and individual preferences.
5. Utilize graphical representations to analyze the relationships among price effects, income effects, substitution effects, and the Slutsky Theorem within the framework of microeconomics.

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## 2.3 THE PRICE EFFECT

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In economics, the price effect refers to how changes in the price of a good or service influence consumer demand. These changes often stem from fluctuations driven by fiscal or monetary policies, which, in turn, affect the overall pricing structure in the market. As a result, shifts in price are reflected in the demand patterns for various goods and services.

This concept is examined under the assumption of *ceteris paribus*—meaning all other factors remain constant. To fully understand the price effect, it is essential to consider the nature of the goods involved, which may be normal, Giffen, or neutral.

- Normal goods exhibit an inverse relationship between price and demand. When the price falls, consumers experience a rise in

real income, leading to increased demand. Conversely, a price increase reduces demand.

- Giffen goods, typically inferior necessities like rice, wheat, or potatoes, show an unusual pattern where a drop in price leads to a decline in demand, and a price rise increases demand. This reflects a direct relationship between price and quantity demanded—an exception to the law of demand.
- Neutral goods are unaffected by price changes. Demand for these goods remains stable regardless of whether the price increases or decreases.

Additionally, there is the concept of the cross-price effect, which arises in the case of related goods. A change in the price of one good can influence the demand for another. For example, a rise in fuel prices may lead to a drop in the demand for automobiles, as these goods are complementary.

1. **Price Effect:** The price effect refers to the alteration in the quantity required of an item that occurs due to a reduction in its price. The change in amount requested occurs concurrently through the combined influence of the substitution impact and the income effect.

**Definition:** The overall impact on the quantity demanded due to a change in the price of a good or service.

**Nature:** It combines the income and substitution effects to show the net change in quantity demanded.

### **Understanding the Price Effect through Budget Lines and Indifference Curves**

The price effect describes how a consumer's demand for a good—say, good X—changes in response to a change in its price, while keeping

income, preferences, and the price of another good (good Y) constant. This concept is often illustrated using budget lines and indifference curves.

As depicted in Figure 2.1, when the price of good X falls, the budget line shifts outward from PQ to PQ<sub>1</sub>, reflecting an increase in the consumer's purchasing power with respect to X. A further price reduction moves the budget line to PQ<sub>2</sub>, indicating that even more of X can now be bought. On the other hand, a rise in the price of X would shift the budget line inward, closer to the origin, reducing the consumer's ability to purchase X.

Assuming PQ<sub>2</sub> is the initial budget line, a doubling of X's price would first move it to PQ<sub>1</sub> and then to the original line PQ. At each of these stages, the consumer reaches a new equilibrium where the budget line is tangent to a higher or lower indifference curve—represented as points R, S, and T on curves I<sub>1</sub>, I<sub>2</sub>, and I<sub>3</sub>, respectively.

Connecting these equilibrium points creates the Price-Consumption Curve (PCC). This curve illustrates how a consumer reallocates their consumption between goods X and Y in response to price changes in X, while holding income and the price of Y constant.



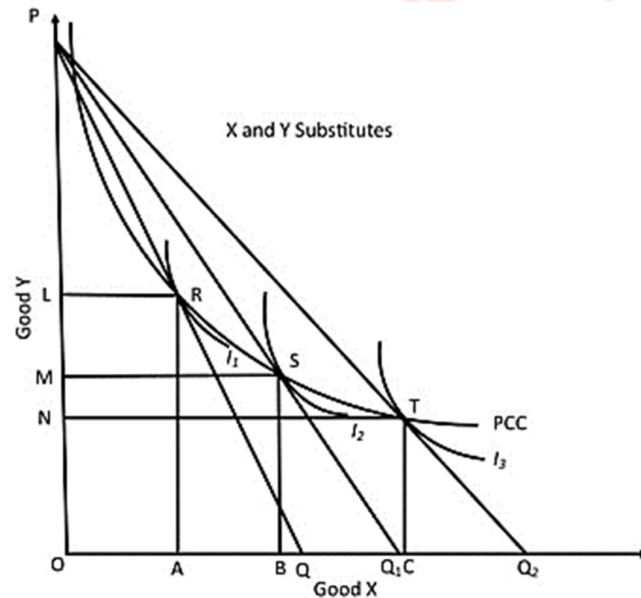


Fig. 2.1 Price effect through indifference curve analysis

## 2.4 INCOME EFFECT

**Income Effect:** When the price of a commodity decreases, the consumer's purchasing power increases. One can purchase the same amount of goods with a reduced amount of revenue spent. For typical goods, the income impact is positive, meaning that as income increases, the amount requested for the commodity also increases. Nevertheless, the income effect has an adverse impact on inferior commodities since consumers tend to opt for other goods as their actual income increases.

**Definition:** Reflects the change in quantity demanded resulting from alterations in real income, holding prices constant.

**Nature:** When prices decrease, consumers experience an increase in real income, leading to higher purchasing power and vice versa.

When analyzing the consumer's equilibrium, it is assumed that the consumer's income is unchanged and the prices of goods X and Y are predetermined.

The Income effect refers to the impact on a consumer's purchases when their income varies, taking into account their preferences and the prices of the goods.

The income effect describes how changes in a consumer's income influence their spending behavior while keeping the prices of goods constant. When income rises, the budget line shifts outward and to the right, running parallel to the original line, indicating an increased purchasing capacity. Conversely, a decline in income causes the budget line to move inward to the left. The parallel movement of budget lines reflects the stability of relative prices.

#### **Assumptions of the Income Effect:**

The **income effect** is based on several fundamental assumptions that explain how variations in consumer income influence purchasing behavior. These assumptions enable economists to analyze and predict consumer choices in response to income fluctuations.

1. **Utility Maximization:** Consumers aim to maximize their utility or satisfaction given their budget constraints. This assumption underlies consumer theory, suggesting that consumers allocate their income in a way that maximizes their overall satisfaction.
2. **Normal Goods vs. Inferior Goods:** The income effect assumes that goods can be categorized into normal goods and inferior goods:

**Normal Goods:** As income increases, demand for normal goods increases because consumers can afford more of them without sacrificing other goods they value.

**Inferior Goods:** As income increases, demand for inferior goods decreases because consumers switch to higher-quality substitutes.



3. **Constant Preferences:** The income effect assumes that consumer preferences remain constant when analyzing the impact of income changes on demand. This means that changes in income alone influence consumption choices, not changes in consumer tastes or preferences.
4. **Income Elasticity of Demand:** The income effect varies depending on the income elasticity of demand for the specific good or service. Goods with higher income elasticity (luxury goods) experience more significant shifts in demand as income changes compared to goods with lower income elasticity (necessities).
5. **Budget Constraint:** The income effect assumes that consumers face a budget constraint, meaning they have a limited amount of income to allocate across different goods and services. Changes in income directly affect this budget constraint, influencing how much consumers can afford to purchase.
6. **Rational Behavior:** Consumers are assumed to behave rationally, meaning they make decisions based on maximizing their utility given their preferences and budget constraints. This rational behavior extends to how consumers adjust their consumption patterns in response to changes in income.

These assumptions collectively help economists and analysts understand and predict how consumers adjust their consumption patterns in response to changes in income, contributing to the broader field of consumer theory and market analysis.

**Types of Income Effect:** There are three types of Income effect:

**1) Positive Income impact:** A positive income impact occurs when rising incomes contribute to rising demand for one or both goods. The income impact is positive for normal items, and the income consumption curve slopes higher and to the right.

**2) Negative Income Effect:** This occurs when a customer cuts down on his consumption of an item as his income rises. When it comes to subpar items, the income impact is negative.

**3) Zero Income impact:** The income impact is said to be zero if there is no change in the amount of a commodity bought in response to a change in income. When it comes to basics like salt and medications, there is a zero income impact.

**Diagrammatic explanations of each of the three effects are provided.**

In Figure 2.2, when the budget line is  $B_1$ , the consumer reaches equilibrium at  $X^*$ , where it intersects the indifference curve  $I_1$ . An increase in the consumer's income shifts  $B_1$  to the right, forming a new budget line, and the new equilibrium point shifts to  $X_1$  on indifference curve  $I_2$ . With a further increase in income, the budget line moves to  $B_3$ , and equilibrium is established at  $X_2$ .

The path traced by the equilibrium points  $X^*$ ,  $X_1$ , and  $X_2$  forms a curve known as the income-consumption curve (ICC). This curve illustrates how changes in consumer income influence the quantity of two goods purchased, assuming their relative prices remain constant. Typically, as income rises, the consumer increases consumption of both goods. In most cases, the income-consumption curve slopes upward to the right, indicating a positive income effect, where both  $X$  and  $Y$  are normal goods.



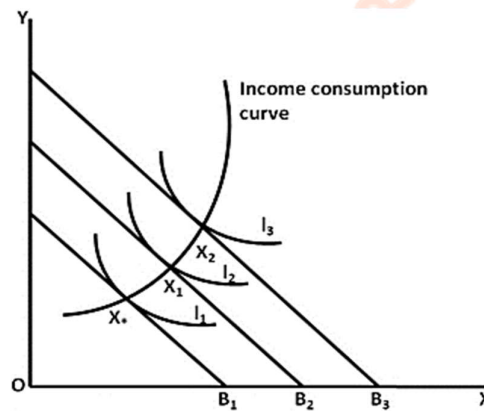


**Fig. 2.2 Income-Consumption Curve for Normal Goods**

However, as long as it doesn't cross an Indifference curve more than once, an income-consumption curve may take on any form. When the consumer's income keeps rising, the second kind of ICC curve may initially have a positive slope before becoming and remaining horizontal. The ICC curve will have the form shown in Fig. 2.3 when X is a superior good and Y is a need.

As income rises, the ICC curve in Figure 2.3 slopes upward until it reaches equilibrium point R at budget line P1Q1 on the indifference curve I2. After this, it becomes horizontal, indicating that the user has consumed enough of good Y to attain saturation. Even though his income continues to rise, he continues to purchase the same quantity of Y (RA). This is frequently the case when a consumer's demand for a necessity (such as salt) doesn't change even as their income does. In this case, Y is essential.

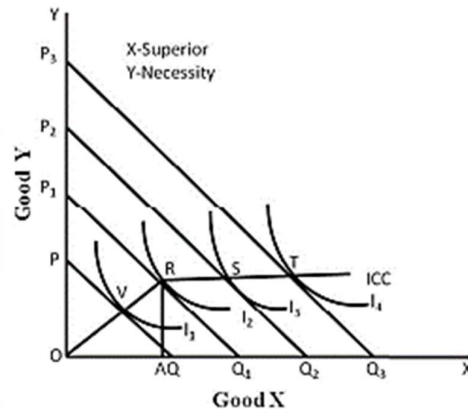


**Fig.2.3 Income-Consumption Curve (X as a Superior Good and Y as a Necessity)**

Figure 2.4 also illustrates the various types of income-consumption curves: (1) ICC1 has a positive slope and is related to normal goods; (2) ICC2 is horizontal from point A, X is a normal good while Y is a necessity that the consumer does not want to have more of as his income increases further; (3) ICC3 is vertical from A, Y is a normal good here and X is satiated necessity; (4) ICC4 is negatively inclined downwards, Y becomes an inferior good from A onwards and X is a superior good; and (5) ICC5 depicts X as an inferior good.

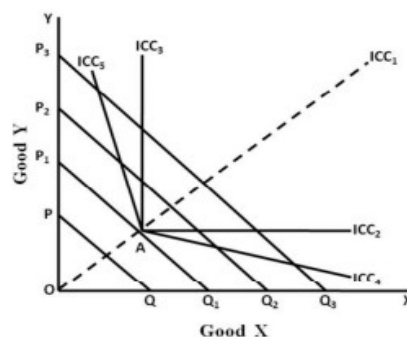


**Fig. 2.4 Potential forms for the Income Consumption Curve (ICC)**

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## 2.5 SUBSTITUTION EFFECT

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**Substitution effect:** When a commodity's price drops and becomes more accessible in comparison to other commodities, this phenomenon is known as the substitution effect. As a result, consumers will buy more of the product since it is comparatively less expensive than other pricey items. The substitution effect is the phenomenon wherein a change in the relative price leads to an increase in the amount required. Although the replacement impact is always positive, its strength varies depending on the commodity's attributes and classification.

**Definition:** captures the shift in consumer preference between goods in response to relative price changes.

**Nature:** As prices change, consumers may substitute one good for another to maintain a consistent level of satisfaction.

### Substitution Effect and Compensating Variation

The substitution effect refers to the change in the quantity demanded of a good due to a change in its price while keeping the price of the other good, real income, and consumer preferences constant. This effect causes consumers to replace a relatively expensive good with a more affordable alternative. Prof. John Hicks distinguished the substitution effect from the income effect using the concept of compensating variation in income.

The substitution effect occurs when the quantity demanded of a goods increases as its price decreases, assuming the consumer's purchasing power remains unchanged. The compensating variation refers to the change in income necessary to neutralize the effect of a price change, ensuring that the consumer's overall financial situation remains stable. Graphically, this is represented by a parallel shift of the budget line until it becomes tangent to the original indifference curve.

As shown in Figure 2.5, the initial budget line PQ has an equilibrium at point R on indifference curve  $I_1$ , where the consumer purchases OB units of good X and BR units of good Y. When the price of X decreases, the consumer's real income effectively increases, shifting the budget line to  $PQ_1$ . To isolate the substitution effect, the increase in real income is adjusted by shifting the budget line leftward to MN, which remains parallel to  $PQ_1$  and becomes tangent to  $I_1$  at point H. This adjustment ensures that the consumer's purchasing power is unchanged, highlighting the pure effect of price changes on demand.

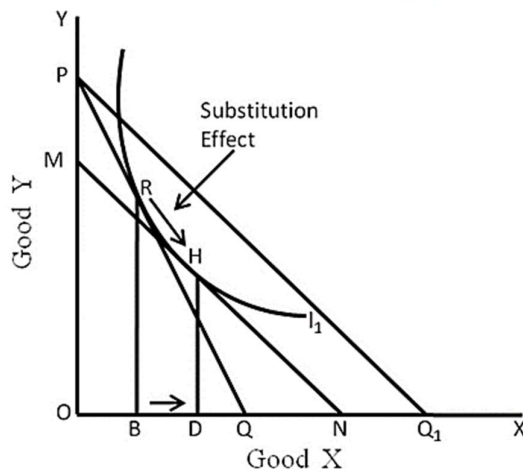


**Fig.2.5 Substitution effect (Hicksian Analysis)**

### **Price Effect as the Sum of Substitution and Income Effects**

The price effect can be expressed as the sum of the substitution effect and the income effect:

$$\text{Price Effect} = \text{Substitution Effect} + \text{Income Effect}$$

In Figure 2.5, the budget line MN is tangent to the original indifference curve  $I_1$  at point H, where the consumer purchases OD units of good X and DH units of good Y. The segment PM of Y or  $Q_1N$  of X represents

the compensating variation in income, ensuring that the budget line MN remains tangent to  $I_1$  at point H.

As a result, the consumer substitutes good X for good Y, moving from point R to point H, which corresponds to the horizontal shift from B to D. This adjustment is known as the substitution effect. The substitution effect is always negative, meaning that when the price of a good decreases (or increases), more (or less) of it is purchased, provided the consumer's real income and the price of the other good remain unchanged. Since there is an inverse relationship between price and quantity demanded, the substitution effect maintains a negative correlation.

### **Price Effect for Different Goods**

There are three possible ways in which the income effect and substitution effect can combine, resulting in different price effects.

**Normal goods:** For normal goods, the overall price effect is positive because both the income effect and substitution effect work in the same direction, leading to an increase in quantity demanded when the price decreases.

$$\text{Price effect} = \text{substitution effect} + \text{income effect}$$

The price effect is positive when both the income effect and substitution effect are positive, which typically occurs in the case of normal goods. This means that a decrease in price leads to an increase in quantity demanded.

**Inferior goods:** For inferior goods, the substitution effect is positive, while the income effect is negative. However, the overall price effect remains positive because the substitution effect is stronger than the negative income effect.

$$\text{Price Effect} = \text{Substitution Effect} + \text{Income Effect}$$



In this case, the price effect remains positive as the substitution effect outweighs the income effect:

$$\text{Substitution Effect} > \text{Income Effect}$$

**Giffen goods:** A Giffen good is a good for which demand increases as the price increases, and falls when the price decreases. Thus, for a Giffen good, the demand curve is an upward-sloping demand curve, which is contrary to the Law of Demand. The substitution effect is positive, but the income effect is negative for Giffen goods. However, the overall price effect becomes negative for Giffen goods. This is because the magnitude of the positive substitution effect is less than the magnitude of the negative income effect.

$$\text{Price effect} = \text{substitution effect} + \text{income effect}$$

Where the price effect is negative because

$$[\text{income effect}] > [\text{substitution effect}]$$

For both normal and inferior goods, the price effect is positive, meaning that a decrease in price leads to an increase in quantity demanded.

However, Giffen goods present an exception to this general rule. In their case, a price reduction leads to a decline in quantity demanded. This occurs because the negative income effect is so strong that it outweighs the positive substitution effect. As a result, the overall impact of a price decrease is negative, causing consumers to purchase less of the good rather than more.

### **Quantifying the Impact Of Price Fluctuations On Income And Consumer Behavior**

The price effect refers to the change in a consumer's choice of goods due to fluctuations in price. It consists of two key components: the income



effect and the substitution effect. The income effect occurs when a decrease in the price of a good increases the consumer's real income, allowing them to purchase more of that good or other goods. On the other hand, the substitution effect arises when consumers shift their consumption from a relatively more expensive good to a cheaper alternative, maximizing their utility.

Understanding the breakdown of these effects helps in analyzing consumer behavior in response to price changes. There are two primary approaches to decomposing the price effect into income and substitution effects, each offering valuable insights into how changes in price impact demand for goods.

**a) The Hicksian method and b) the Slutsky method.**

The Hicksian technique employs two ways for decomposing the price effect:

- Compensating Variation in Income
- Equivalent Variation in Income

Slutsky employed the cost-difference approach to separate the price effect into its two key components. Similarly, Hicks introduced the Compensating Variation method to analyze these changes in consumer behavior.

In this method of breaking down the price effect into income and substitution effects, compensating variation is used to adjust the consumer's income, ensuring they return to their initial indifference curve, which represents their original level of satisfaction before the price change.

When the price of a good falls, the consumer moves to a new equilibrium on a higher indifference curve, indicating an increase in satisfaction. To

neutralize this gain in well-being, a portion of the consumer's income is deducted, forcing them back to their original indifference curve. This reduction in income, often conceptualized as a lump sum tax, offsets the rise in satisfaction resulting from the price drop. This adjustment is termed offsetting variation in income.

This process, known as compensatory variation in income, counteracts the enhanced utility gained due to a price reduction. Figure 2.6 visually represents how the price effect is broken down into its two components—the substitution effect and the income effect—using the compensating variation approach.

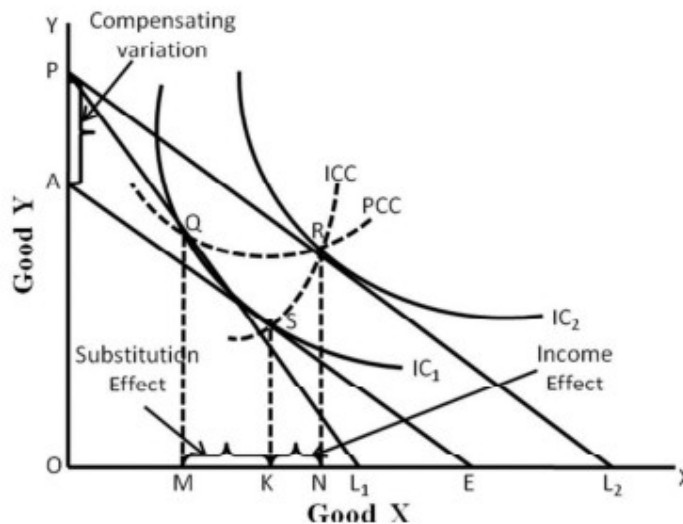


**Fig. 2.6 Breakdown of the Price Effect into Income and Substitution Effects Using Compensating Variation in Income**

Figure 2.6 illustrates how a decrease in the price of good X leads to a shift in the budget line to PL2, effectively increasing the consumer's purchasing power. This allows the consumer to buy more of both goods,

ultimately reaching a new equilibrium at point R on a higher indifference curve, IC<sub>2</sub>. The reduction in the price of good X enhances overall satisfaction.

To neutralize the increase in utility resulting from the price drop, the consumer's income is reduced by the compensatory variation. This adjustment returns them to their initial indifference curve, IC<sub>1</sub>. Consequently, the consumer purchases a higher quantity of X, as it has become relatively cheaper. In Figure 2.6, this income reduction causes the budget line to shift to AB, which is parallel to PL<sub>2</sub> and intersects IC<sub>1</sub>, indicating the consumer's preferences before the price change.

The budget line AB, maintaining the same slope as PL<sub>2</sub>, reflects the revised relative prices, demonstrating that X is now more affordable. Given this change, the consumer adjusts their consumption by substituting X for Y to maximize utility. When monetary income is reduced by the compensating variation (PA in terms of Y or L<sub>2</sub>B in terms of X), the consumer moves along the same indifference curve, IC<sub>1</sub>, replacing Y with X. At price line AB, equilibrium is achieved at point S on IC<sub>1</sub>, where the consumer opts for a greater quantity of X over Y. The movement from point Q to point S represents the substitution effect, which occurs due to changes in relative prices while maintaining real income constant.

If the restitution of the wealth that was previously confiscated is provided to him, he would transition from point S, on indifference curve IC<sub>1</sub> to point R on a superior indifference curve IC<sub>2</sub>. The shift from point S on a lower indifference curve to point R on a higher indifference curve is attributed to the income effect. Therefore, the transition from point Q to point R, caused by the change in price, may be divided into two stages. The first stage involves the movement from Q to S due to the substitution impact, while the second stage involves the movement from S to R due

to the income effect. The pricing effect is the outcome of both a substitution effect and an income effect.

In Fig. 2.6 the various effects on the purchases of good X are:

- Price effect = MN
- Substitution effect = MK
- Income effect = KN
- $MN = MK + KN$  or  
Price effect = Substitution effect + Income effect

### CHECK YOUR PROGRESS

1. What is the price effect? How does a change in price affect consumer demand?

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2. Distinguish between the income effect and the substitution effect.

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## 2.6 SLUSKY'S THEOREM

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According to Slutsky's method, if the price of good changes and the consumer's actual income or purchasing power grows, the consumer's income will vary by the same amount as the change in purchasing power caused by the price change. The individual's purchasing power fluctuates in proportion to the product of the price change and the quantity of goods purchased at the previous price.

Put simply, according to Slutsky's approach, income is adjusted by the exact amount necessary for the consumer to maintain the ability to purchase the same mix of goods at the previous price.

In other words, the income is affected by the discrepancy between the cost of buying a certain amount of good X at the previous price and the cost of buying the same quantity of X at the current price. The alteration in income is attributed to the disparity in costs. In the Slutsky substitution effect, income is altered by the cost differential rather than by compensating variation, as is the case with the Hicksian replacement effect.

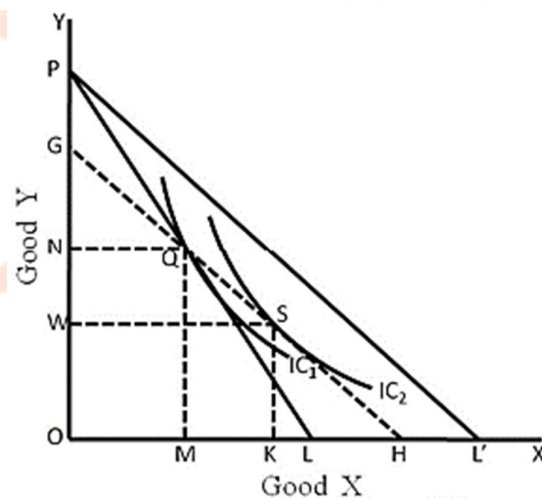


**Fig. 2.7 Derivation of demand curve from indifference curve**

At first, the customer reaches equilibrium at point Q on the indifference curve IC1, where they are purchasing OM units of good X and ON units of good Y. This equilibrium is determined by the consumer's money income and the prices of the two items, as shown by the price line PL. Assume that the price of X decreases but the prices of Y and the consumer's income remain unchanged. Due to the decrease in the price

of X, the price line will shift to  $PL'$ , resulting in a rise in the consumer's actual income or purchasing power.

To determine Slutsky's substitution effect, the consumer's money income should be decreased by the cost difference, or the amount that would allow him to only afford the previous combination Q, if desired.

To do this, a parallel line GH to  $PL'$  has been sketched, intersecting the point Q. This implies that the consumer has seen a reduction in income equivalent to PG in relation to Y or LH in relation to X. Consequently, the client now has the option to purchase combination Q, as it also falls on the price line GH.

The consumer's decision to purchase the combination Q has been influenced by the recent decrease in price of X and the increase in price of Y. The alteration in relative prices will prompt the consumer to reorganize his acquisitions of X and Y. He will replace Y with X. However, in the Slutsky substitution effect, the consumer will not shift along the same indifference curve  $IC_1$ . This is because the price line GH, which the consumer must adhere to given the new price and income conditions, does not intersect the indifference curve  $IC_1$ .

The pricing line GH intersects the indifference curve  $IC_2$  at point S, forming a tangent. Consequently, the consumer will achieve equilibrium at point S, which lies on a higher indifference curve  $IC_2$ . The transition from Q to S illustrates the Slutsky substitution effect, wherein the customer shifts between different indifference curves rather than remaining on the same one.

The movement from Q to S, resulting from the Slutsky substitution effect, is solely caused by the change in relative prices. This is because any gain in purchasing power has been nullified by reducing the money income by the same amount as the cost difference.

At S, the buyer is purchasing a satisfactory quantity of X and a sufficient amount of Y; the marketable quantity of X has been used as a replacement for the non-marketable quantity of Y. Hence, the Slutsky substitution effect on good X refers to the rise in the quantity purchased by MK, whereas the Slutsky substitution effect on good Y denotes the decline in the quantity purchased by NW.

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## 2.7 SUMMARY

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In this unit delves the fundamental concepts of consumer theory crucial for understanding economic decision-making. It begins with the exploration of price and income effects, highlighting how changes in prices and incomes impact consumer demand for goods and services. The price effect elucidates the inverse relationship between price and quantity demanded, pivotal in determining market behavior and elasticity. Meanwhile, the income effect examines how changes in income alter consumer purchasing power, categorizing goods into normal and inferior categories based on their demand responses. Subsequently, the unit explores the substitution effect, illustrating how consumers switch between goods in response to price changes, crucial for analyzing market dynamics and consumer behavior. Lastly, the Slutsky theorem synthesizes these effects, offering insights into how price and income changes interact to influence consumer choices, providing a robust framework for economists to predict and understand consumer responses in varying economic scenarios.

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## 2.8 GLOSSARY

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- **Price Effect:** The change in quantity demanded of a good or service resulting from a change in its price, assuming other factors remain constant.
- **Income Effect:** The change in quantity demanded of a good or service due to a change in consumer income, assuming prices of other goods remain constant.



- **Normal Goods:** Goods for which demand increases as consumer income increases, and decreases as income decreases.
- **Inferior Goods:** Goods for which demand decreases as consumer income increases, and increases as income decreases.
- **Substitution Effect:** The change in quantity demanded of a good due to a change in its relative price compared to substitute goods, assuming utility remains constant.
- **Slutsky Equation:** An equation that separates the total effect of a price change into an income effect and a substitution effect.
- **Consumer Theory:** The study of how individuals make consumption decisions to maximize their utility subject to budget constraints.
- **Indifference Curve:** A curve showing combinations of goods that provide equal satisfaction or utility to a consumer.
- **Budget Constraint:** The limit on a consumer's expenditure set by their income and the prices of goods and services.
- **Utility Maximization:** The economic principle that consumers allocate their income to maximize their overall satisfaction or utility.
- **Price Elasticity of Demand:** A measure of how much the quantity demanded of a good responds to changes in its price.
- **Market Equilibrium:** The point where quantity demanded equals quantity supplied at a given price level.
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## 2.9 EXERCISES

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1: What is the difference between the price effect and the income effect? Provide an example for each.

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**2:** How does the substitution effect influence consumer choices? Explain with a simple example.

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**3:** Define normal goods and inferior goods. Give a real-life example of each and explain how their demand changes with income fluctuations.

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**4:** What does the Slutsky theorem explain? How does it help economists understand consumer behavior?

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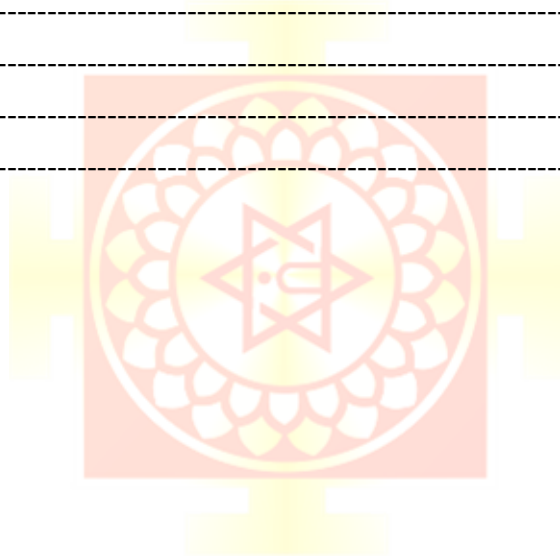
**5:** Why is it important for businesses and policymakers to understand price and income effects? Give two practical examples of how this understanding can be applied.

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## 2.10 SUGGESTED READINGS

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1. Ahuja H.C., (1991) Advanced Economic Theory, S.Chand & Co., New Delhi.
2. Kreps, David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
3. Layard, P.R.G. and A.W. Walters (1978), Microeconomic Theory, McGraw Hill, New York.
4. Sen, A. (1999), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
5. Baumol, W.J. (1982), Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
6. Hirshleifer, J. and A.Glazer (1997), Price Theory and Applications, Prentice Hall of India, New Delhi.
7. Salvatore, Dominic (1991), Microeconomic Theory, 3<sup>rd</sup> Edition, McGraw Hill, New Delhi.



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## **UNIT 3: COMPENSATED DEMAND CURVE AND REVEALED PREFERENCE HYPOTHESIS**

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### **STRUCTURE**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Compensated Demand Curve
  - 3.3.1 Definition and Concept
  - 3.3.2 Key Features of the Compensated Demand Curve
  - 3.3.3 Derivation of the Compensated Demand Curve
  - 3.3.4 Differences from the Marshallian Demand Curve
- 3.4 Revealed Preference Hypothesis
  - 3.4.1 Meaning and Concept
  - 3.4.2 Characteristics of Indifference Curves
  - 3.4.3 Indifference Map
- 3.5 Summary
- 3.6 Glossary
- 3.7 Exercises
- 3.8 Suggested Readings

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### **3.1 INTRODUCTION**

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Unit3 explores advanced concepts in consumer theory that deepen our understanding of how individuals make choices based on their preferences and budget constraints. This unit begins by delving into the compensated demand curve, a theoretical construct that adjusts for changes in prices while keeping real income constant. Understanding this curve helps economists analyze how consumers' purchasing decisions respond to price changes, offering insights into price elasticity and consumer welfare. The unit also examines the Revealed Preference Hypothesis, which posits that observed consumer choices reveal underlying preferences that can be inferred from their behavior. This

hypothesis allows economists to test the consistency and rationality of consumer preferences through empirical analysis. By studying these concepts, students gain a nuanced grasp of consumer behavior beyond basic demand theory, preparing them to apply these frameworks in real-world economic analysis and policy formulation.

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### **3.2 OBJECTIVES**

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After studying this unit, you will be able to:

1. Understand the compensated demand curve and its role in adjusting for income changes while analyzing price elasticity.
2. Differentiate the compensated demand curve from the ordinary demand curve and its implications for consumer behavior analysis.
3. Study the Revealed Preference Hypothesis to infer consumer preferences from observed choices and assess their rationality.
4. Explore empirical methods to test the validity of the Revealed Preference Hypothesis.
5. Apply these concepts to interpret real-world consumer choices, market dynamics, and policy implications effectively.

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### **3.3 COMPENSATED DEMAND CURVE**

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The compensated demand curve illustrates the amount of a product that a customer would purchase if their income were adjusted to offset a price adjustment for that product. The compensated demand curve for an item represents the quantity that a customer would buy at a different price, assuming the income impact is removed.

#### **3.3.1 Definition and Concept**

##### **Definition of Compensated Demand Curve**

The compensated demand curve, also known as the Hicksian demand curve, represents the quantity of a goods that a consumer would purchase at different prices while maintaining a constant level of utility.

In other words, it shows how the demand for a goods changes purely due to price changes, with the consumer's satisfaction (or utility) remaining unchanged.

### **Concept of Compensated Demand Curve**

The compensated demand curve focuses on isolating the substitution effect from the income effect when the price of a goods change.

- **Substitution Effect:** The change in quantity demanded of a goods resulting from a change in its price, with the consumer's utility held constant. This effect reflects how consumers will substitute the cheaper good for the relatively more expensive one.
- **Income Effect:** The change in quantity demanded of a goods resulting from a change in the consumer's real income or purchasing power, due to the price change.

The compensated demand curve eliminates the income effect by adjusting the consumer's income to keep their utility constant. This adjustment is known as compensation, ensuring that any observed change in quantity demanded is solely due to the substitution effect.

### **Key Features of the Compensated Demand Curve**

1. **Constant Utility:** The primary characteristic of the compensated demand curve is that it holds the consumer's utility constant. When prices change, the consumer is compensated with an income adjustment to maintain the same level of satisfaction.
2. **Isolating Substitution Effect:** By keeping utility constant, the compensated demand curve isolates the substitution effect. It shows how consumers would change their consumption purely based on relative price changes, without the influence of changes in their real income.
3. **Mathematical Formulation:** The compensated demand curve can be derived from the expenditure minimization problem. The

consumer aims to minimize the cost of achieving a fixed level of utility.

$$\text{Minimize } \sum p_i x_i \text{ subject to } U(x_1, x_2, \dots, x_n) = U$$

Here,  $p_i$  represents the prices of goods,  $x_i$  represents the quantities of goods, and  $U$  represents the fixed level of utility.

The compensated demand curve may be elucidated by considering both the Hicks and Slutsky approaches to the substitution impact. The diagram labelled Figure 45(A) depicts the design of the Hicks and Slutsky compensated demand curves, as well as the uncompensated demand curve (also known as the ordinary or Marshallian demand curve). The diagram is shown in a two-story format.

The top section of the diagram illustrates the substitution effects of the Hicks and Slutsky studies, as well as the combined pricing impact.

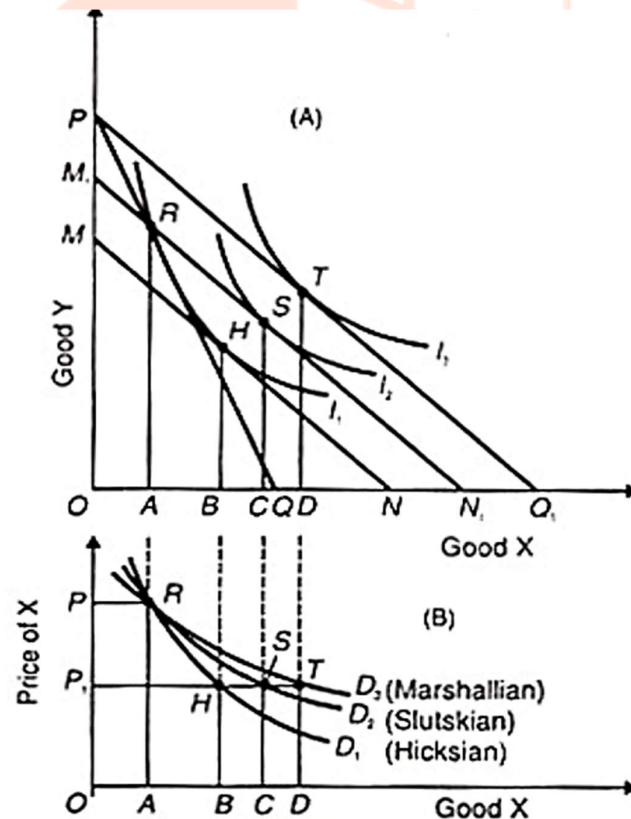


**Fig.3.1 Compensated and Uncompensated Demand Curves:**

## Deriving the Marshallian, Hicksian, and Slutsky Demand Curves

The lower portion of the diagram is designed to illustrate the derivation of three important demand curves in microeconomic theory: the Hicksian compensated demand curve, the Slutsky compensated demand curve, and the Marshallian (uncompensated) demand curve. In this diagram (Figure B), the vertical axis measures the price of good X, and different points on this axis represent changes in its price.

Suppose we begin at point P on the vertical axis, which corresponds to the initial price of goods X when the budget line is PQ in the upper diagram (Figure A). As the price of goods X falls, the budget line shifts to PQ<sub>1</sub>, corresponding to point P<sub>1</sub> in the lower diagram.

### 1. Marshallian (Uncompensated) Demand Curve

The Marshallian demand curve captures the relationship between the price of a goods and the quantity demanded, holding income and preferences constant, but without adjusting for changes in real income. It reflects the total price effect, including both substitution and income effects.

Initially, the consumer is in equilibrium at point R in the upper diagram, where the budget line PQ is tangent to the indifference curve I<sub>1</sub>. At this point, the consumer purchases OA units of good X.

When the price of X decreases, the budget line shifts to PQ<sub>3</sub>, allowing the consumer to reach a new equilibrium at point T on a higher indifference curve I<sub>3</sub>, where they now purchase OD units of goods X. This movement from R to T illustrates the price effect—a combination of the substitution and income effects. The corresponding demand relationship, plotted in the lower diagram as curve D<sub>3</sub>, represents the Marshallian (uncompensated) demand curve, showing an increase in quantity demanded as the price of goods X falls from P to P<sub>1</sub>.



### **The Hicksian Compensated Demand Curve**

To further understand the concept of compensated demand, we examine the Hicksian substitution effect, which isolates the impact of a price change on consumption by holding utility constant. This allows us to assess how consumers substitute one goods for another solely due to changes in relative prices, excluding the income effect.

When the price of goods X falls, the consumer's real purchasing power increases. To isolate the substitution effect, we construct a compensated budget line, denoted as MN, which is parallel to the new budget line  $PQ_1$  but tangent to the original indifference curve  $I_1$ . This line reflects the new prices but adjusts income to maintain the same utility level as before the price change. The point of tangency, H, shows the consumer's new choice purely due to the change in relative prices.

The movement from point R to point H on the same indifference curve  $I_1$  reflects the Hicksian substitution effect. In the lower section of the diagram, this movement corresponds to a shift in quantity demanded from OA to OB, forming the Hicksian compensated demand curve ( $D_1$ ). It shows that as the price of good X drops from P to  $P_1$ , the quantity demanded increases, excluding any income-related changes in behavior.

### **The Slutsky Compensated Demand Curve**

In contrast to Hicks, the Slutsky approach compensates consumers for changes in purchasing power by adjusting income so that the consumer can still afford their original bundle after a price change. This approach keeps the initial consumption bundle attainable, rather than holding utility constant.

To construct the Slutsky substitution effect, we draw the budget line  $M_1N_1$ , which is parallel to the original budget line PQ and passes through the original equilibrium point R on indifference curve  $I_1$ . This ensures

that the consumer can still purchase OA units of goods X, even after the price change.

When the price of X decreases, the consumer moves from point R to S on the higher indifference curve  $I_2$ , achieving a higher level of utility. The corresponding movement in the lower diagram shows an increase in quantity demanded from OA to OC, tracing out the Slutsky compensated demand curve ( $D_2$ ).

### **Comparison of Hicksian, Slutsky, and Marshallian Demand Curves**

A key distinction between the Hicksian and Slutsky demand curves lies in how they handle the income effect. The Hicks method keeps utility constant, while the Slutsky method adjusts income to maintain the original consumption bundle. As a result:

- Slutsky's demand curve ( $D_2$ ) is generally more elastic than Hicks' curve ( $D_1$ ), since it allows greater expenditure on goods X.
- The traditional (Marshallian) demand curve ( $D_3$ ), which incorporates both income and substitution effects, is typically even more elastic than the compensated curves.

Both the Hicksian and Slutsky compensated demand curves slope downward, reflecting the pure substitution effect—as price decreases, quantity demanded increases. However, the Marshallian demand curve may slope downward or upward, depending on the dominance of the substitution or income effect. In most practical cases, the standard demand curve still slopes downward due to the typical reinforcing nature of both effects.

### **4. Graphical Representation**

In a graphical analysis, the compensated demand curve (also known as the Hicksian demand curve) is generally steeper than the ordinary or Marshallian demand curve. This is because the compensated demand

curve accounts solely for the substitution effect, while the ordinary demand curve captures both substitution and income effects. The compensated curve illustrates how much of a goods a consumer would buy at various price levels if their income were adjusted to maintain a constant utility level.

By excluding the income effect, the compensated demand curve provides a more refined understanding of consumer behavior in response to price changes alone. It helps to isolate the impact of relative price variations on consumer choices, independent of changes in purchasing power.

### **5. Utility Adjustment**

One of the key features of the compensated demand curve is its reliance on income adjustment to maintain a constant utility level. As the price of a goods changes, the consumer's real purchasing power also changes. To derive the compensated demand curve, the consumer's income is adjusted in such a way that they remain on the same indifference curve, ensuring their utility stays constant.

This adjustment makes it possible to analyze pure substitution effects how consumers switch between goods when relative prices change without being influenced by the accompanying income changes. Thus, utility adjustment plays a central role in deriving the compensated demand curve and is fundamental to modern consumer theory.

### **Practical Implications of the Compensated Demand Curve**

The concept of the compensated demand curve is widely used in both theoretical and applied economics, particularly in:

#### **1. Consumer Surplus Estimation**

The compensated demand curve provides a more accurate measure of consumer surplus, as it maintains the consumer's utility constant

throughout the analysis. This helps in evaluating the welfare impact of price changes more precisely than the ordinary demand curve.

## **2. Policy Analysis**

In the context of taxation, subsidies, and price regulation, the compensated demand curve allows policymakers to isolate the substitution effect. This is crucial in understanding how consumers adjust their consumption patterns when relative prices are altered due to policy changes, holding utility constant.

## **3. Welfare Economics**

The compensated demand curve is foundational in cost-benefit analysis and the evaluation of welfare programs. It helps economists analyze the loss or gain in consumer welfare resulting from changes in market conditions or policy interventions.

### **3.3.2 Derivation of the Compensated Demand Curve**

The derivation of the Hicksian compensated demand curve involves the process of minimizing expenditure while ensuring that the consumer achieves a fixed level of utility. The goal is to determine the combination of goods the consumer would choose at different prices if they were always kept on the same indifference curve.

#### **Step-by-Step Derivation:**

1. **Start with an Initial Equilibrium:** The consumer is initially in equilibrium at point R, where the budget line is tangent to an indifference curve  $I_1$ .
2. **Price Change of Good X:** When the price of goods X falls, the new budget line shifts outward (e.g., from PQ to  $PQ_1$ ), allowing access to a higher indifference curve due to increased purchasing power.

3. **Construct a Compensated Budget Line:** To isolate the substitution effect, draw a new budget line (MN) that is parallel to  $PQ_1$  but tangent to the original indifference curve  $I_1$ . This budget line represents the new prices but adjusted income so that the consumer remains on the same utility level.
4. **Identify the Substitution Effect:** The movement from point R to point H (on  $I_1$ ) shows how the consumer substitutes goods X for goods Y purely due to the price change, while utility remains constant.
5. **Plot the Hicksian Demand Curve:** The different quantities of goods X demanded at various compensated price levels form the Hicksian demand curve. This curve slopes downward and reflects the substitution effect only.

### Mathematical Derivation

1. **Utility Maximization Framework:** Consumers aim to maximize their utility subject to a budget constraint:

$$\max U(x_1, x_2, \dots, x_n) \text{ subject to } \sum_{i=1}^n p_i x_i \leq M$$

Here,  $x_i$  represents the quantities of goods;  $p_i$  represents their prices, and  $M$  is the consumer's income.

2. **Expenditure Minimization Problem:** To derive the compensated demand curve, we shift the focus to minimizing expenditure while achieving a given level of utility  $\bar{U}$

$$\min \sum_{i=1}^n p_i x_i \text{ subject to } U(x_1, x_2, \dots, x_n) = \bar{U}$$

3. **Lagrangian Function:** Construct the Lagrangian function to solve the expenditure minimization problem:

$$L = \sum_{i=1}^n p_i x_i + \lambda(\bar{U} - U(x_1, x_2, \dots, x_n))$$

Here,  $\lambda$  is the Lagrange multiplier.

4. **First-Order Conditions:** Take the partial derivatives of the Lagrangian with respect to each good  $x_i$  and the Lagrange multiplier  $\lambda$ :

$$\frac{\partial L}{\partial x_i} = p_i - \lambda \frac{\partial U}{\partial x_i} = 0 \text{ for all } i$$

$$\frac{\partial L}{\partial \lambda} = \bar{U} - U(x_1, x_2, \dots, x_n) = 0$$

**Solving the System of Equations:** Solve these equations simultaneously to find the optimal quantities of goods  $x_i^*$ :

$$\frac{p_i}{\frac{\partial U}{\partial x_i}} = \lambda \text{ for all } i$$

This implies that the marginal utility per dollar spent is equal across all goods.

**Hicksian (Compensated) Demand Functions:** The solutions  $x_i^*(p, U^-)$  are the Hicksian demand functions, showing the quantities of goods demanded at given prices while maintaining utility  $U^-$

### 3.3.4 Differences between Marshallian and Hicksian (Compensated) Demand Curves

| Aspect | Marshallian Demand Curve | Hicksian (Compensated) Demand Curve |
|--------|--------------------------|-------------------------------------|
| Name   | Ordinary demand curve    | Compensated demand curve            |

| <b>Aspect</b>                   | <b>Marshallian Demand Curve</b>             | <b>Hicksian (Compensated) Demand Curve</b>       |
|---------------------------------|---------------------------------------------|--------------------------------------------------|
| <b>Utility</b>                  | Not held constant                           | Held constant                                    |
| <b>Effects Reflected</b>        | Both income and substitution effects        | Only substitution effect                         |
| <b>Derivation</b>               | Utility maximization with budget constraint | Expenditure minimization with utility constraint |
| <b>Graphical Representation</b> | Downward sloping, income effect included    | Typically steeper, isolates substitution effect  |
| <b>Focus</b>                    | Overall demand changes with income effect   | Pure substitution effect                         |

Understanding these differences is crucial for analyzing consumer behavior under different scenarios. The Marshallian demand curve gives a comprehensive view including both effects, while the Hicksian demand curve provides a focused analysis of the substitution effect, which is particularly useful in welfare economics and policy analysis.

### Check Your Progress

1. What is a compensated demand curve?

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2. How does the compensated demand curve isolate the substitution effect?

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### 3.4 REVEALED PREFERENCE HYPOTHESIS

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Revealed preference theory was introduced by Paul Samuelson in 1938. This approach to the theory of demand is based solely on observations of how consumers react to changes in prices and income. Since Samuelson's analysis of demand is based on observed market behaviour of consumers, revealed preference theory is called the *behaviouristic theory of demand*. Revealed preference theory is free from any assumptions concerning cardinal or ordinal utility.

#### Assumptions

1. **Rationality:** The consumer is rational. The objective of the consumer is the maximization of his utility. Thus, a consumer prefers bundles of goods that include more quantities of the commodities.
2. **Consistency in Choice:** If the consumer chooses bundle A over B in one period, he will not choose bundle B over A in another period if both bundles are available to him.
3. **Transitivity:** If bundle A is revealed preferred to B and B is revealed preferred to C, then A is revealed preferred to C.
4. The consumer can be induced to purchase any bundle of goods if its price is made sufficiently attractive.
5. **The Revealed Preference Axiom:** “Choice reveals the preference of a consumer”. This axiom states that if a consumer buys bundle A out of the available bundles A, B, C and D, the consumer has revealed his preference for bundle A. The chosen bundle of goods maximizes the utility of the consumer.
6. **The Revealed Preference Relation is Anti-Symmetric:** If the combination A is revealed preferred to combination B, B cannot be revealed preferred to A.
7. The consumer's tastes remain the same.

## Revealed Preference

Revealed preference theory is based on the hypothesis that choice reveals the preference of a consumer. A consumer will decide to buy some particular basket of goods either because he likes it more than another basket of goods or because it is cheap when compared with other baskets of goods. Suppose that a consumer buys basket of goods A out of the available baskets A, B, C and D. If A is not less expensive than the bundles B, C and D, the consumer has revealed preference for bundle A. Thus, we can say that basket A is revealed to be preferred to other baskets (or that the others are revealed to be inferior to A).

The concept of revealed preference can be clarified with the help of a diagram. The income of the consumer and the prices of the two goods X and Y are given by the price line PL. Suppose that the consumer purchases combination A. Any combination on the price line costs the same amount as combination A. Every point below the budget line is revealed inferior to A because it represents a basket of goods that is less expensive than A. Any point lying above the budget line represents a basket of goods that is more expensive and cannot therefore be revealed inferior to A.

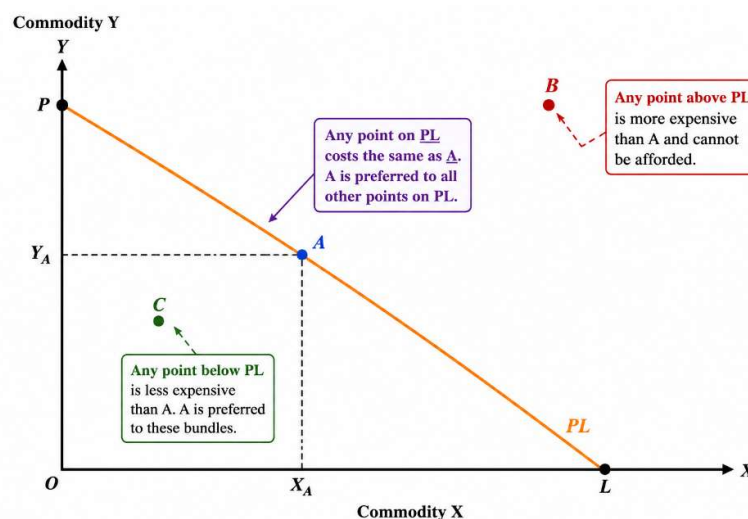


**Fig.1.1. Revealed Preference**

If the consumer chooses A, it is revealed preferred to all other combinations. The revealed preference for a particular combination of goods implies the maximization of the utility of the consumer.

### **Strong Ordering and Weak Ordering**

A set of items is strongly ordered if each item has its own place in that order, which is not shared with any other item (for example, all the letters of the alphabet are strongly ordered). Revealed preference theory is based on strong ordering because it assumes that the choice of a combination reveals the consumer's preference for it over all other alternative combinations open to him. Choice can reveal preference for a combination only if all the alternative combinations are strongly ordered.

A set of items is weakly ordered if the items are clustered into groups but none of the items within a group can be put ahead of the others. Indifference curve analysis is based on weak ordering because all the points on a given indifference curve are equally desirable and hence occupy the same place in the order. Weak ordering implies that the consumer chooses a position and rejects others open to him. The rejected positions need not be inferior to the position actually chosen but may have been indifferent to it. Hence under weak ordering, actual choice fails to reveal definite preferences. The difference between strong ordering and weak ordering is clear from the fact that indifference curves themselves are strongly ordered, whereas points on an indifference curve are weakly ordered.

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## **3.5 SUMMARY**

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"Compensated Demand Curve and Revealed Preference Hypothesis" focuses on advanced concepts in consumer theory essential for understanding how individuals make choices amidst budget constraints and varying prices. The unit begins by exploring the compensated demand curve, which adjusts for changes in prices while keeping real

income constant, providing insights into how consumers' purchasing decisions respond to price fluctuations. This analysis aids in understanding price elasticity and consumer welfare more accurately than with the standard demand curve. Additionally, the unit delves into the Revealed Preference Hypothesis, which asserts that observed consumer choices reflect underlying preferences that can be inferred through empirical testing. This hypothesis allows economists to assess the consistency and rationality of consumer behavior, crucial for validating economic models and policy recommendations. By mastering these concepts, students develop skills to apply theoretical frameworks to real-world data, enabling them to analyze consumer behavior, market dynamics, and economic policies with greater precision and relevance.

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### 3.6 GLOSSARY

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- **Compensated Demand Curve:** A curve that adjusts for changes in prices while keeping real income constant, illustrating how quantity demanded changes in response to price changes, holding purchasing power constant.
- **Income Effect:** The change in quantity demanded of a goods or service resulting from a change in consumer income, assuming prices remain constant.
- **Price Elasticity of Demand:** A measure of how sensitive the quantity demanded of a goods is to changes in its price.
- **Ordinary Demand Curve:** The traditional demand curve that shows the relationship between price and quantity demanded, without adjusting for income changes.
- **Revealed Preference Hypothesis:** The theory that consumer preferences can be inferred from observed choices, assuming consumers make rational decisions based on maximizing their utility given their budget constraints.

- **Hicksian Demand Function:** A mathematical representation of the compensated demand curve, derived from the minimization of expenditure subject to a utility constraint.
- **Empirical Testing:** Methods used to test the validity of economic theories and hypotheses using real-world data and statistical analysis.
- **Rationality of Consumer Behavior:** The belief that consumers choose options that provide them with the highest possible satisfaction or utility, based on their preferences and financial limitations.
- **Market Efficiency:** The extent to which market prices reflect all available information and resources are allocated optimally to maximize social welfare.

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### 3.7 EXERCISES

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1: What is the purpose of the compensated demand curve in consumer theory? How does it differ from the ordinary demand curve?

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2: Explain the concept of the Hicksian demand function. How is it derived, and what does it reveal about consumer behavior?

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3: Define the Revealed Preference Hypothesis. How can this hypothesis be tested empirically, and why is it important in understanding consumer choices?

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4: Discuss the implications of income and substitution effects in consumer theory. How do these effects influence the shape of the compensated demand curve?

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5: How does understanding price elasticity of demand help in formulating pricing strategies for businesses? Provide a practical example to illustrate your answer.

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### 3.8 SUGGESTED READINGS

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1. Varian, Hal R. Intermediate Microeconomics: A Modern Approach. 9th ed., W. W. Norton & Company, 2014. (Chapter on Compensated Demand and Consumer Theory)
2. Mas-Colell, Andreu, et al. Microeconomic Theory. Oxford University Press, 1995. (Chapters on Consumer Choice and Welfare)

3. Nicholson, Walter, and Christopher Snyder. Microeconomic Theory: Basic Principles and Extensions. 12th ed., Cengage Learning, 2014. (Sections on Compensated Demand and Consumer Behavior)
4. Hausman, Jerry A. "Contingent Valuation: A Critical Assessment." Elsevier Science Publishers B.V., 1993.
5. Deaton, Angus, and John Muellbauer. Economics and Consumer Behavior. Cambridge University Press, 1980.
6. Varian, Hal R. "The Hicksian Approach to Consumer Theory." Journal of Economic Perspectives, vol. 9, no. 2, 1995, pp. 115-128.
7. <https://www.economicsdiscussion.net/demand-curve/compensated-demand-curve-with-diagram/18371>





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## **UNIT-4: DEMAND - ELASTICITY OF DEMAND, ENGLE CURVE, AND CONSUMER SURPLUS**

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### **STRUCTURE**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Demand
  - 4.3.1 Meaning and Concept of Demand
- 4.4 Elasticity of Demand
  - 4.4.1 Meaning and Concept
  - 4.4.2 Types of Elasticity
  - 4.4.3 Factors Influencing Elasticity of Demand:
- 4.5 Engle Curve
- 4.6 Consumer Surplus
- 4.7 Summary
- 4.8 Glossary
- 4.9 Exercises
- 4.10 Suggested Readings

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### **4.1 INTRODUCTION**

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In this unit, we explore the essential concepts of demand in microeconomics, focusing on the elasticity of demand, Engel curves, and consumer surplus. Understanding how consumers respond to changes in prices, incomes, and the availability of goods is crucial for analyzing market behavior and making informed economic decisions. Elasticity of demand measures this responsiveness, including price elasticity, income elasticity, and cross-price elasticity, which provide insights into consumer behavior and help firms in pricing strategies. The Engel curve illustrates the relationship between a consumer's income and their spending on goods, distinguishing between normal and inferior goods based on income changes. Consumer surplus, the difference

between what consumers are willing to pay and what they actually pay, serves as an indicator of consumer welfare and market efficiency. By comprehensively studying these aspects, students will gain valuable tools for analyzing market responses, optimizing pricing, and evaluating economic policies, ultimately enhancing their understanding of consumer behavior and market dynamics.

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## 4.2 OBJECTIVES

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By the end of this unit, you should be able to

1. Learn the types, calculations, and interpretations of price, income, and cross-price elasticity of demand.
2. Identify factors affecting elasticity and explore its use in pricing strategies, revenue optimization, and taxation.
3. Understand the Engel curve's relationship between income and consumption, and distinguish between normal and inferior goods.
4. Calculate and interpret consumer surplus, and analyze its impact on consumer welfare and market conditions.
5. Use elasticity, Engel curves, and consumer surplus to optimize business decisions and assess policy impacts on markets.

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## 4.3 DEMAND

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### 4.3.1 Meaning and Concept of Demand

Demand represents the quantity of a product or service that consumers are both willing and financially able to purchase at different price levels within a certain time frame. It reflects not just the desire to own goods or services but also the purchasing power to acquire them. As a core concept in economics, demand helps explain how variations in price influence consumer choices and shape market dynamics.

### Concept of Demand:

In economics, **demand** refers to the quantity of a goods or service that buyers are ready and capable of purchasing at varying price levels during a specific period. This concept is shaped by several key factors that influence consumer purchasing behavior.

1. Consumer demand is determined by the desire of individuals to purchase a certain product or service. This willingness is determined by things such as individual preferences, personal tastes, and the perceived usefulness of the item or experience.

2. The capacity to pay is just as important as the want to pay. Demand is contingent upon customers possessing the necessary financial resources to engage in a transaction. Price sensitivity refers to the degree to which the quantity desired of a commodity or service changes in response to a change in its price. According to the law of demand, when all other factors remain constant, a drop in price leads to an increase in quantity demanded, and conversely, a rise in price leads to a decrease in quantity required. The inverse correlation between price and amount desired is a crucial principle in comprehending demand.

4. The demand schedule and demand curve depict the link between the price of a product and the quantity that consumers are willing to purchase. This relationship is visually represented by a demand curve. A demand schedule presents a tabular depiction of this correlation.

5. Shifts in demand may occur due to external causes, such as changes in consumer income, tastes, expectations, or the cost of linked commodities. An upward change in demand causes the whole demand curve to shift to the right, while a downward shift causes it to shift to the left.

6. Demand analysis may be conducted at both the individual and market levels. Individual demand pertains to the specific tastes and buying patterns of a solitary consumer, while market demand encompasses the combined preferences and behaviour of all customers within a given market.

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## 4.4 ELASTICITY OF DEMAND

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### Concept of Elasticity of Demand:

Elasticity of demand pertains to the change in demand for a product or service when there is a modification in one of the factors that purchasers take into account when making their purchasing choices. A link exists between demand and another variable, such as price, availability of replacements, advertising pressure, and consumer income.

If a change in any of those factors leads to a substantial change in the demand for a product or service, then its demand elasticity is regarded to be high. From a different perspective, elasticity demonstrates that a customer's purchasing behaviour is remarkably adaptable or malleable, akin to the stretchiness of an elastic waistband. The level of client willingness to alter purchase choices directly correlates with the elasticity of a product or service. If a client is prepared to switch to a different brand of coffee just due to a temporary discount or fully abstain from purchasing coffee due to an increase in its price, the demand for coffee may be described as elastic.

In contrast, items that are inelastic do not undergo significant changes in demand as a result of variations in their purchase-consideration factors. Customers exhibit a steadfast or inflexible behaviour when it comes to their purchasing decisions for certain items, showing a reluctance or inability to adapt. Tobacco goods and utilities exemplify the concept of inelastic demand, whereby changes in pricing or promotion do not have a substantial impact on customer demand.

Elastic demand refers to the ability to make flexible buying choices, including the option to adjust the quantity bought, choose a different

brand, or substitute the product. Inelastic demand remains constant, with little flexibility. Hence, the major objective of marketers is frequently to diminish elasticity by positioning a product as indispensable, thereby ensuring that buyers would persistently make purchases under most situations. Consider a firm that has the ability to raise the price of its product without seeing a substantial decrease in demand. Alternatively, a business may have clients that exhibit such strong loyalty that they consistently make purchases at the same level, even during periods of reduced personal income. Gaining a comprehension of elasticity facilitates the transition towards inelasticity.

Some sectors are considered to be recession-resistant due to the inelasticity of their goods. This means that demand for these items stays consistent even during economic downturns. Health care, utilities, and some "vices" like as alcohol and tobacco are goods that often exhibit constant demand, unaffected by price or the customer's money. In addition, they often create strong brand loyalty or obstacles to changing, contributing to consumers' reluctance (or incapacity) to move brands, as shown with physicians and utilities.

### **Types of Elasticity of demand**

There are four categories of elasticity, distinguished by the component that causes it - pricing, related items, consumer income, and advertising. The formulas for estimating each kind of elasticity may be used for scenario-planning or retrospective analysis. However, it is crucial to acknowledge that consumer behaviour is not a precise science, and making predictions can be challenging.

### **Price Elasticity of Demand (PED):**

When buyers exhibit a strong response to changes in price, the price elasticity of demand (PED) is high. Consequently, in the event of inflation leading to price hikes, consumers will respond by decreasing their purchases via tactics such as switching, substituting, or abstaining. Conversely, it may also suggest that lowering prices may lead to more sales. The equation for price elasticity of demand (PED) is:

**Formula:**

$$PED = \frac{\% \Delta Q_d}{\% \Delta P}$$

**Explanation:**

- **Elastic Demand:**  $|PED| > 1$  (Quantity demanded changes more than the price change)
- **Inelastic Demand:**  $|PED| < 1$  (Quantity demanded changes less than the price change)
- **Unitary Elastic Demand:**  $|PED| = 1$  (Quantity demanded changes exactly as the price change)

**Income Elasticity of Demand (YED):**

YED, which stands for "Y" in reference to income in economics, represents the correlation between demand and a customer's income. As income declines, the amount of demand generally decreases, even when all other parameters, such as price, stay constant. The concept of consumer expenditure dynamics (YED) varies depending on the product's importance. Economists classify essential items such as food, clothing, and other essentials as "normal goods." During a decrease in consumers' income, these things are given more priority over luxury goods. Moreover, expenditures on ordinary products are more prone to rise initially when income rises, whereas the increase in spending on luxury goods occurs with a delay. The equation for the calculation of the YED (Income Elasticity of Demand) is as follows:

$$YED = \frac{\% \Delta Q_d}{\% \Delta I}$$

**Explanation:**

- **Normal Goods:**  $YED > 0$  (Demand increases with income)
- **Inferior Goods:**  $YED < 0$  (Demand decreases with income)
- **Luxury Goods:**  $YED > 1$  (Demand increases more than proportionately with income)

**Cross-Price Elasticity of Demand (XED):**



Cross elasticity occurs when changes in the price of one product led to shifts in the demand for another. This relationship exists when the two goods are either substitutes or complements. If two products serve as substitutes, a rise in the price of one typically increases the demand for the other. For example, if coffee prices rise, consumers may switch to tea, leading to higher demand for tea. Conversely, if two goods are complementary, an increase in the price of one usually results in a decline in the demand for the other. For instance, if coffee prices go up, the demand for coffee creamer may drop as people consume less coffee. Cross-price elasticity of demand (XED) does not apply to unrelated goods, such as airline tickets and oranges. The formula for XED is:

$$XED = \frac{\% \Delta Q_d (\text{Good A})}{\% \Delta P (\text{Good B})}$$

**Interpretation:**

- Substitutes:  $XED > 0$  (Demand for Good A increases as the price of Good B increases)
- Complements:  $XED < 0$  (Demand for Good A decreases as the price of Good B increases)

**Factors Influencing Elasticity of Demand:**

The elasticity of demand measures how sensitive the quantity demanded of a good or service is to changes in its determinants such as price, consumer income, and prices of related goods. Several factors influence the elasticity of demand:

1. **Availability of Substitutes:** The more substitutes available for a good, the more elastic the demand. If consumers can easily switch to another product when the price of a good rises, the demand for that good is likely to be elastic.

**Examples:**

If the price of butter increases, consumers may switch to margarine, indicating high elasticity.



If the price of a specific brand of coffee increases and there are many other brands available, the demand for that brand is likely to be elastic.

**2. Necessity vs. Luxury:** Goods that are essential for daily living, such as food, water, and basic clothing, tend to have inelastic demand because consumers will buy them regardless of price changes.

**Luxuries:** Goods that are not essential, such as designer clothes, fine dining, and vacations, tend to have elastic demand because consumers can forego them when prices rise.

- **Examples:**

Salt has inelastic demand because it is a necessity with few substitutes.

Vacation travel has elastic demand because it is a luxury and can be postponed or substituted with cheaper alternatives.

**3. Proportion of Income Spent on the Good:** If a good takes up a significant portion of a consumer's income, the demand is likely to be elastic. Consumers will be more responsive to price changes because such goods significantly affect their budget.

**Low Proportion:** If a good takes up a small portion of a consumer's income, the demand is likely to be inelastic because changes in price will not significantly affect their overall budget.

**Examples:**

Housing and automobiles, which take up a large part of the budget, generally have elastic demand.

Toothpicks and chewing gum, which take up a small part of the budget, generally have inelastic demand.

**4. Time Period:**

**Short Run:** In the short run, demand is usually more inelastic because consumers need time to adjust their behavior and find substitutes.

**Long Run:** In the long run, demand tends to be more elastic as consumers have more time to adjust their consumption habits and find alternatives.

**Examples:**

If gasoline prices rise, in the short run, people may not significantly change their driving habits (inelastic demand). However, in the long run, they may buy more fuel-efficient cars or use public transportation (elastic demand).

**5. Addiction or Habitual Consumption:** Goods that are addictive or habit-forming tend to have inelastic demand because consumers find it difficult to reduce their consumption even when prices increase.

**Examples:**

Tobacco and alcohol have inelastic demand because of their addictive nature.

Caffeine, found in coffee and energy drinks, may also exhibit inelastic demand for habitual

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## 4.5 ENGLE CURVE

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An Engel Curve is a visual depiction of Engel's Law, illustrating the correlation between family income and expenditure on a certain product or service. The Engel Curve represents the relationship between a consumer's income and the quantity of a good or service that they purchase. Named after the German statistician Ernst Engel, the Engel Curve helps in understanding how consumer spending patterns change with variations in income.

**Key Aspects of the Engel Curve:**

1. **Shape and Slope:** The shape of the Engel Curve varies depending on whether the good is a normal good, an inferior good, or a luxury good.

**Normal Goods:** For normal goods, the Engel Curve slopes upwards, indicating that as income increases, the quantity demanded also increases.

**Inferior Goods:** For inferior goods, the Engel Curve slopes downwards after a certain income level, indicating that as income increases beyond a certain point, the quantity demanded decreases.

**Luxury Goods:** For luxury goods, the Engel Curve is more convex, showing a rapid increase in quantity demanded as income rises.

2. **Income Elasticity of Demand:** The Engel Curve is closely related to the concept of income elasticity of demand, which measures the responsiveness of quantity demanded to changes in income.

**Positive Income Elasticity:** Indicates a normal good.

**Negative Income Elasticity:** Indicates an inferior good.

**Greater than One:** Indicates a luxury good.

The Engel Curve is a vital tool in understanding how income changes affect consumer demand for different types of goods, and it plays a significant role in economic analysis and business strategy.

### Check Your Progress

1. What is price elasticity of demand? What does it measure?

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2. What is an Engel Curve? How does it differ for normal and inferior goods?

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## 4.6 CONSUMER SURPLUS

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A quantifiable evaluation of the benefits that consumers get as a result of market competition is known as consumer surplus. When the price that customers pay for a product or service is less than what they are willing to pay, this is known as consumer surplus. It measures the additional benefit that consumers get when they purchase a product at a lower cost than they were initially prepared to pay.

Consumer excess may be contrasted with producer surplus.

### **The concept of consumer surplus**

The notion of consumer surplus was created in 1844 to quantify the societal advantages of public assets, such as national roads, canals, and bridges. It has had a significant role in the realm of welfare economics and the development of tax policy by governments.

Consumer surplus is derived from the economic concept of marginal utility, which refers to the incremental enjoyment that a customer obtains from consuming an extra unit of an item or service. The usefulness of a product or service is subjective and differs across individuals according to their unique preferences.

Generally, when customers acquire more of a certain commodity or service, their willingness to pay for extra units decreases because of the declining marginal utility, which refers to the decreasing additional satisfaction or benefit gained from each subsequent unit. A consumer surplus arises when the customer's willingness to pay for a particular product exceeds the prevailing market price.

The formula for consumer surplus is a mathematical expression that quantifies the difference between the maximum price a consumer is willing to pay for a product or service and the actual price they pay.

Consumer surplus is defined by economists using the following equation:

$$\text{Consumer surplus} = \left(\frac{1}{2}\right) \times Q_d \times \Delta P$$

What is the location or place where something is happening or being referred to?

$Q_d$  represents the quantity at equilibrium, which occurs when the supply and demand are in balance.

$\Delta P$  represents the maximum price that a customer is willing to pay. -  $P_d$  (the price at equilibrium where supply and demand intersect)

### **Measuring Consumer Surplus:**

The demand curve is a visual depiction used to compute consumer surplus. The graph illustrates the correlation between the price of a product and the amount of the product required at that price. The price is shown on the y-axis, while the quantity demanded is represented on the x-axis. The demand curve has a declining slope due to the principle of diminishing marginal utility.

Consumer surplus is quantified as the region bounded by the downward-sloping demand curve, the horizontal line representing the market price, and the y-axis. It represents the difference between the maximum amount a consumer is prepared to pay for a certain quantity of an item and the actual market price. Consumer surplus may be computed either at an individual level or at an aggregate level, depending on whether the demand curve is for an individual or for a group.

The consumer surplus has a consistent pattern of growth when the price of an item reduces, and conversely, it experiences a decline when the price of a goods increases. Suppose that buyers are prepared to pay \$50 for the first unit of product A and \$20 for the 50th unit, as an example. Assuming a steady demand curve, if 50 units are sold at a price of \$20 each, then 49 units were sold at a price lower than what consumers were willing to pay, resulting in a consumer surplus.

When the demand for a commodity is fully elastic, the consumer surplus becomes zero. However, when consumer excess is unlimited, demand becomes completely inelastic.

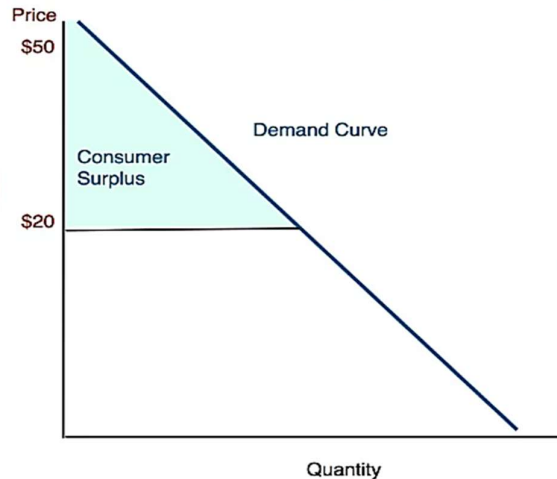


**Fig.4.1 Consumer Surplus**

### **Illustration of Consumer Surplus**

Consumer surplus refers to the economic gain that consumers receive by purchasing a product at a price lower than what they are willing to pay, resulting in a sense of satisfaction or contentment. For instance, suppose you purchased an Aeroplane ticket for a trip to Disney World during a school vacation week for \$100, even though you were anticipating and prepared to spend \$300 for a single ticket. The amount of \$200 corresponds to your consumption surplus. Nevertheless, companies possess the knowledge and strategies to convert the excess enjoyed by consumers into surplus for themselves as producers. In this scenario, suppose the airline becomes aware of the excess demand and, as the date of the school vacation week approaches, increases the price of its tickets to \$600 apiece.

The airline anticipates a surge in demand for travel to Disney World during school vacation week, and expects customers to be prepared to pay elevated costs. By increasing the ticket costs, the airlines are converting potential consumer excess into producer surplus, so generating greater profits.

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## 4.7 SUMMARY

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In this unit, we delved into the fundamental aspects of demand, focusing on elasticity of demand, Engel curves, and consumer surplus. We started by understanding elasticity of demand, which measures how sensitive the quantity demanded is to changes in price, income, and the prices of related goods. This included price elasticity, income elasticity, and cross-price elasticity, each providing critical insights into consumer behavior and helping firms in setting optimal pricing strategies. We then explored Engel curves, which depict the relationship between a consumer's income and their spending on various goods, helping to classify goods as normal or inferior based on income changes. Lastly, we analyzed consumer surplus, the difference between what consumers are willing to pay and what they actually pay, which is a key indicator of consumer welfare and market efficiency. By examining these concepts, students gained the tools to analyze market responses, optimize pricing and revenue, and evaluate the impact of economic policies. Understanding how elasticity, income effects, and consumer surplus interplay allows for a comprehensive analysis of market dynamics and consumer behavior, equipping students with the necessary knowledge to make informed economic decisions and assessments.

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## 4.8 GLOSSARY

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- **Elasticity of Demand:** Measures how much quantity demanded responds to changes in price, income, or other goods.
- **Price Elasticity of Demand (PED):** Responsiveness of quantity demanded to price changes.
- **Income Elasticity of Demand (YED):** Responsiveness of quantity demanded to income changes.



- **Cross-Price Elasticity of Demand (XED):** Responsiveness of quantity demanded for one good to a price change in another good.
- **Normal Goods:** Demand increases with rising income.
- **Inferior Goods:** Demand decreases with rising income.
- **Substitutes:** Goods that can replace each other, with positive cross-price elasticity.
- **Complements:** Goods used together, with negative cross-price elasticity.
- **Engel Curve:** Shows the relationship between income and quantity demanded.
- **Consumer Surplus:** Difference between what consumers are willing to pay and what they actually pay.
- **Demand Curve:** Graph showing the relationship between price and quantity demanded.
- **Marginal Cost (MC):** Additional cost of producing one more unit.
- **Marginal Revenue (MR):** Additional revenue from selling one more unit.
- **Revenue Optimization:** Adjusting prices and production to maximize revenue.
- **Market Efficiency:** When all information is reflected in prices and resources are optimally allocated.

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## 4.9 EXERCISES

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1. What is price elasticity of demand and how is it calculated?

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2. How do normal and inferior goods differ in terms of income elasticity of demand?

3. What is the Engel curve and what information does it provide about consumer behavior?

4. How is consumer surplus calculated and why is it important in economic analysis?

5. How can firms use elasticity of demand in setting pricing strategies?

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#### **4.10 SUGGESTED READINGS**

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1. Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach (9th ed.). W.W. Norton & Company.
2. Mankiw, N. G. (2018). Principles of Microeconomics (8th ed.). Cengage Learning.
3. Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics (9th ed.). Pearson.
4. Koutsoyiannis, A. (1979). Modern Microeconomics (2nd ed.). Macmillan Press.
5. Krugman, P., & Wells, R. (2020). Microeconomics (5th ed.). Worth Publishers.
6. Marshall, A. (1920). Principles of Economics. Macmillan.
7. Sloman, J., Garratt, D., & Guest, J. (2018). Economics (10th ed.). Pearson.
8. Frank, R. H., & Bernanke, B. S. (2019). Principles of Microeconomics (7th ed.). McGraw-Hill Education.
9. Stiglitz, J. E., & Walsh, C. E. (2006). Economics (4th ed.). W.W. Norton & Company.
10. Besanko, D., & Braeutigam, R. R. (2020). Microeconomics (6th ed.). Wiley.

# **BLOCK II: THEORY OF PRODUCTION AND COST**

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## **UNIT-5: PRODUCTION FUNCTION IN SHORT RUN AND LONG RUN**

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### **STRUCTURE**

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Theories of Production
  - 5.3.1 Meaning and Concept
- 5.4 Short-Run Production Functions
  - 5.4.1 Total Product (TP)
  - 5.4.2 Marginal Product (MP)
  - 5.4.3 Average Product (AP)
- 5.5 The Law of Diminishing Marginal Product
  - 5.5.1 Definition
  - 5.5.2 Types
- 5.6 Variables Affecting the Short-term Production Function
- 5.7 Long-Run Production Function
- 5.8 Summary
- 5.9 Glossary
- 5.10 Exercises
- 5.11 Suggested Readings

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### **5.1 INTRODUCTION**

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The study of production functions serves as a cornerstone in understanding how inputs such as labor and capital combine to produce outputs. "Unit 5: Production Function in Short Run and Long Run" delves into this fundamental concept, distinguishing between short-run, where at least one input remains fixed, and long-run, where all inputs can vary. At its core, the production function illustrates the technological

relationship between inputs and outputs, elucidating the efficiency and constraints within which firms operate. Through the lens of the short-run, the unit explores the Law of Variable Proportions, revealing insights into diminishing marginal returns and the shapes of Total Product (TP) and Marginal Product (MP) curves. Transitioning to the long-run, the focus shifts to Returns to Scale, investigating how doubling inputs impacts output, and the strategic implications for firms aiming to optimize their production processes. This unit also examines the intersection of production technology with cost structures, elucidating how advancements influence cost curves and strategies for cost minimization. By comprehensively exploring these topics, learners gain a foundational understanding crucial for analyzing production dynamics across various industries and economic scenarios.

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## **5.2 OBJECTIVES**

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By the end of this unit, you should be able to:

1. Comprehend the definition and significance of the production function in economics.
2. Differentiate between the short-run and long-run production functions.
3. Explain the law of diminishing returns and its impact on production.
4. Explain the idea of returns to scale and how it influences production decisions over the long run.
5. Analyze the relationship between input usage and output in the long run.

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### 5.3 CONCEPT OF THE PRODUCTION FUNCTION

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The production function is an economic term that elucidates the correlation between the physical output and input. Output is the quantitative measure of the total amount of products or services that are produced during a certain timeframe. Input refers to the quantity of resources or commodities used in the production of output. Production refers to the act of manufacturing things and services for consumption. On the other hand, the production function is a notion that describes the quantitative connection between input and output. The production function consists of four primary components.

The equation  $Q$  is a function of variables  $A, B, C, D$ , and so on.

$Q$  is the greatest output that can be created by the inputs  $A, B, C, D$ , etc., where  $f(.)$  denotes the technical restriction of the company.

The production function refers to the functional connection between physical inputs, also known as components of production, and the resulting output. The model takes inputs as the explanatory or independent variable and outputs as the dependent variable. Mathematically, we may express this in the following manner:

The equation  $Q = f(L, K)$  represents a mathematical relationship between the variables  $Q, L$ , and  $K$ .

In this context, the variable ' $Q$ ' denotes the output, whereas ' $L$ ' and ' $K$ ' indicate the inputs, namely labour and capital (such as equipment) accordingly. It is important to acknowledge that there might be several other components, but, for the sake of our analysis, we have only considered inputs from two factors.

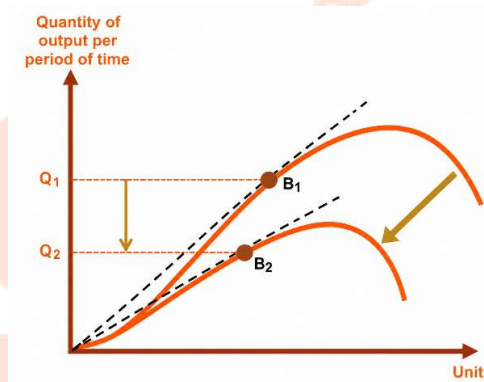


**Fig.5.1 Time Period and production function**

The production function is defined differently in the short run and the long run. This differentiation is quite significant in the field of microeconomics. The differentiation is established according to the inherent characteristics of factor inputs.

Variable factors are inputs that have a direct correlation with the outcome. The following are the variables that may be altered. Variable influences are present in both the short run and the long run. Variable variables include elements such as daily-wage labour and raw commodities.

Conversely, fixed factors refer to those elements that remain constant and unalterable while the output undergoes changes. These elements are often indicative of the short-term or transient period alone. In the long term, fixed factors are non-existent.

Therefore, we may establish two distinct production functions: one for the short-run and another for the long-run. The short-run production function establishes the correlation between a single variable component, while holding all other variables constant, and the resulting output. The production function is explained by the rule of returns to a factor.

For instance, let's take a scenario where a company has 20 units of labour and 6 acres of land. Initially, the company decides to use just one unit of labour (which is a variable element) on its land (which is a fixed factor).



The land-labor ratio is 6:1. If the company decides to hire 2 units of labour, the land-labor ratio will be 3:1 (6:2).

The long-run production function and the short-run production function vary conceptually. Here, all components are systematically altered in equal proportions. The phenomenon being described is elucidated by the concept known as the law of returns to scale. It quantifies the extent to which the output varies in proportion to changes in the inputs.

## 5.4 PRODUCTION FUNCTION IN SHORT RUN

In the field of economics, the term "short-run" refers to a certain time frame during which at least one element of production remains constant and cannot be altered. This condition is often encountered in real-life scenarios when it is not possible to make instantaneous modifications to all inputs.

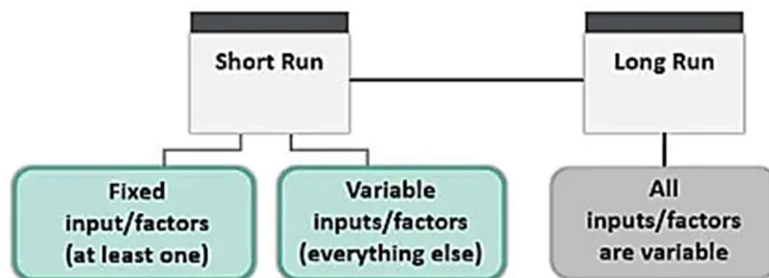


Fig.5.2 Short Run vs. Long Run

A short-run production function is a technical correlation between the maximum output generated and the elements of production, where at least one component of production remains constant while the other factors vary.

The short-run production function may be expressed as a two-factor model.

$$Q = f(L, \bar{K})$$

In this context, Q represents the output, L represents the variable element of labour, K represents capital, and  $f(\cdot)$  represents the functional connection. The presence of a bar above the letter K signifies that the usage of capital is constant, meaning it is a fixed component of production. The availability of money is often considered to be unresponsive in the short term, but adaptable in the long term. The lack of flexibility of the component is one of the reasons why it is believed to be fixed in the short term. Therefore, in the immediate term, any fluctuations in output are only caused by adjustments in the Utilisation of the variable input of production, namely labour in this case.

#### **5.4.1 Total Product (TP)**

The total product (TP) of a factor refers to the highest level of output (Q) that may be achieved by varying the employment of that element while keeping all other production factors constant. The Total Product of Labour (TPL) is calculated using the following formula:

$$TPL = Q = f(L)$$

**5.4.2 Marginal Product (MP):** The additional output produced by an additional unit of the variable input, calculated as

$$MP = \Delta TP / \Delta L$$

**5.4.3 Average Product (AP):** The output per unit of the variable input, calculated as

$$AP = TP/L$$

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## **5.5 THE LAW OF DIMINISHING MARGINAL PRODUCT**

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The law of diminishing marginal product states that as the quantity of a variable input used in the production process increases, while all other factors of production remain constant, the marginal product of that

variable input may initially increase, but will eventually reach a point where it starts to decline.

Stages of Production:

1. **Increasing Returns:** MP is rising.
2. **Diminishing Returns:** MP is falling but positive.
3. **Negative Returns:** MP is negative.

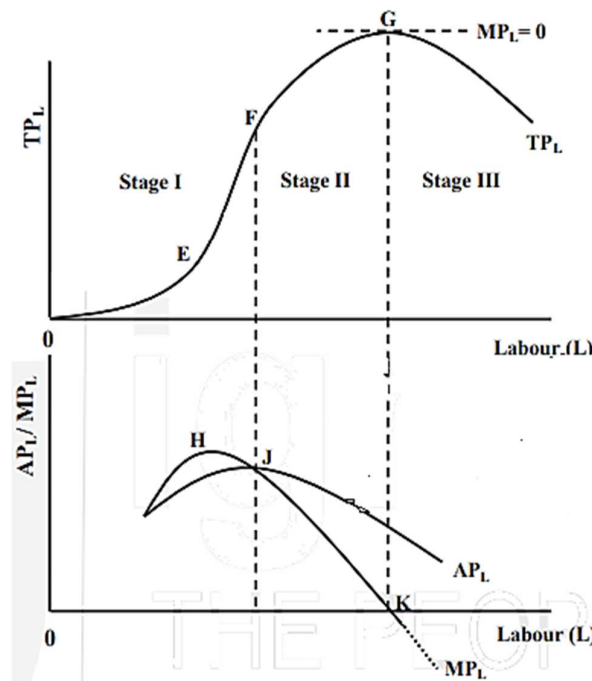


**Fig. 5.3 Law of Variable Proportion**

**Stage 1:** This phase starts at the starting point and concludes at position F, as seen in portion (a) of Figure 5.3. At point F, the average product of labour (APL) achieves its maximum value, which is equal to the marginal product of labour (MPL) represented by point J in portion (b) of Figure 5.3. The point at which the total product ceases to increase at an accelerating pace and begins to increase at a decelerating rate is referred to as the point of inflection, denoted as point E. At point E, the curvature of TPL transitions from convex to concave.

**Stage 2** begins at position F and concludes at point G, as shown in portion (a) of Figure 5.3.

At point F, the AP curve achieves its maximum, shown by point J. Both the AP and MP curves have declining portions, with the MP curve reaching zero, or touching the horizontal axis, at point K. The overall product from point F to point G exhibits diminishing returns, with the marginal product decreasing while yet being positive. At point K, the marginal product of the variable component becomes zero. The stage of declining returns is characterized by a continual decrease in both the average and marginal products of the variable component.

**Stage 3:** Starting at point G, the overall output decreases and descends. The marginal product of the variable component is negative. The stage of negative returns is characterized by an excessive percentage of the variable element in relation to the fixed factor.

### Check Your Progress

1. What is a production function? Explain its significance in production analysis.

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2. Distinguish between Total Product, Average Product, and Marginal Product.

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## 5.6 VARIABLES AFFECTING THE SHORT-TERM PRODUCTION FUNCTION

Various factors influence the production function in the short term, determining the efficiency of converting inputs into outputs.

### Productivity of variable inputs

**Worker productivity:** The proficiency and effectiveness of labour have a substantial influence on the duration of the growing returns phase.

**Input Quality:** The efficiency of manufacturing may also be affected by the quality of raw materials.

Assessment of the Standard and Ability of Stationary Resources

The condition and capacity of fixed assets, such as equipment, have a significant impact on the level of production.

**Technological constraints:** Outdated technology may restrict manufacturing efficiency, accelerating the occurrence of diminishing returns.

**External Factors Market Conditions:** Fluctuations in demand and supply might have a short-term influence on production choices.

The regulatory environment encompasses government policies and regulations that have the potential to impact the production capacity and efficiency of industries.

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## 5.7 LONG-RUN PRODUCTION FUNCTION

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The long-run production function describes the connection between input and output when both labour and capital are considered as variable inputs.

Over time, the availability of both labour and capital inputs is expected to be flexible, meaning that they may be adjusted regularly. Consequently, organizations have the ability to use greater amounts of both inputs. Increasing the quantity of both inputs leads to a higher level of output. The rules of returns to scale describe the functional link between the changing scale of inputs and output in the long term. The principles of returns to scale may be elucidated via the use of the isoquant approach.

### **Isoquant Curve:**

The laws of returns to scale examine the connections between varying input and output. These laws are derived from the production function and isoquant curve. The name "isoquant" is derived from the Greek word "iso," meaning equal. An isoquant curve is the set of points that illustrate

various combinations of capital and labour that may be used to generate an identical level of output.

The term "equal product curve" or "production indifference curve" is used interchangeably to refer to this concept. The isoquant curve closely resembles the indifference curve. Nevertheless, there are two distinct differences between the isoquant curve and the indifference curve. Firstly, the graphical depiction of indifference curve considers two consumer products, while the isoquant curve represents two producer goods. Additionally, the indifference curve quantifies the degree of contentment, and the isoquant curve quantifies the production output.

**Several commonly accepted interpretations of the isoquant curve may be identified:**

Ferguson defines an isoquant as a graphical representation that illustrates all the feasible combinations of inputs that may produce a certain degree of output.

Peterson defines an isoquant curve as a graphical representation that illustrates the many combinations of two variable elements that may be used to generate an equivalent total result. Based on the definitions provided before, we may infer that the isoquant curve is created by graphing various combinations of inputs. An isoquant curve represents the optimal combination of inputs that yields the highest possible output.

**The assumptions of isoquant curve:**

- i. Assumes a binary input model consisting of labour and capital for the production of a product.
- ii. Assumes that capital, labour, and goods are inherently capable of being divided into smaller parts.
- iii. Assumes that capital and labour exhibit declining rates of substitution due to their imperfect substitutability.
- iv. Assumes prior knowledge of manufacturing technique.

The isoquant curve may be constructed by considering various combinations of capital and labour, based on these assumptions. The

combinations are designed to ensure that they have no impact on the outcome.

**Figure-5.2 is an isoquant curve illustrating four different combinations of capital and labour.**

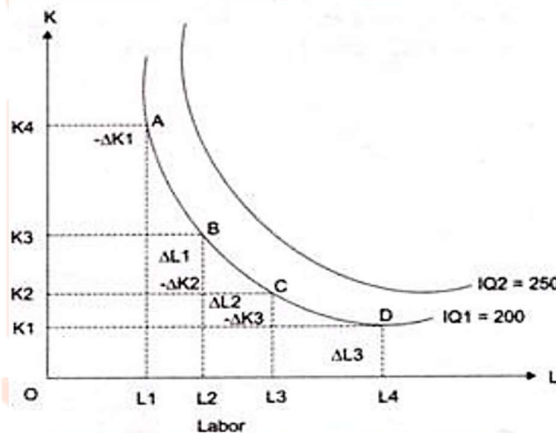


**Figure-5.4 is an isoquant curve illustrating four different combinations of capital and labour**

Figure-5.4 displays the output IQ1 for four different combinations of capital and labour. Figure-5.4 demonstrates that the amount of production remains constant at 200 units throughout the IQ1 curve, despite variations in the combinations of capital and labour. Points A, B, C, and D indicate the four permutations on the IQ1 curve.

**Table-1 displays the correlation between the input and output variables for the IQ1 curve.**

| Table-6: Relationship between Input and Output in Different Cases |                   |        |       |
|-------------------------------------------------------------------|-------------------|--------|-------|
| Choice                                                            | Input Combination | Output | Total |
| A                                                                 | $L_1 + K_1$       | 200    | 200   |
| B                                                                 | $L_2 + K_2$       | 200    | 200   |
| C                                                                 | $L_3 + K_3$       | 200    | 200   |
| D                                                                 | $L_4 + K_4$       | 200    | 200   |

As we get from A to D in Table, there is a decrease in capital accompanied by an increase in labour. This demonstrates that labour is used as a replacement for capital, without affecting the production.



The isoquant curve has a strong resemblance to the indifference curve, as previously mentioned. The characteristics of an isoquant curve may be elucidated in relation to input and output.

### **The properties of the isoquant curve**

#### **Convex to Origin:**

Illustrates the replacement of inputs and the decreasing rate at which inputs may be substituted for one other in a certain economic area. The concept of declining marginal rate of technological substitution will be further explained later. This indicates that the relative importance of one input (capital) compared to another input (labour) decreases as we go down the isoquant curve. In Table-4, it is evident that when the quantity of capital increases for the production of 200 units of output, the quantity of labour required decreases.

#### **Negative Slope:**

The statement suggests that the slope of the isoquant curve is negative. This occurs when an increase in capital (K) leads to a decrease in the amount of labour (L), or vice versa, in order to maintain a constant level of production. According to the data in Table-4, increasing the quantity of labour from one unit to two units results in a drop in the amount of capital from four to three units. This adjustment is made in order to maintain a consistent level of production, which is measured at 200 units.

#### **Non-intersecting and non-tangential:**

It may be inferred that two isoquant curves (as seen in Figure-5.5) are incapable of intersecting each other. Figure depicts the point where two isoquant curves meet.

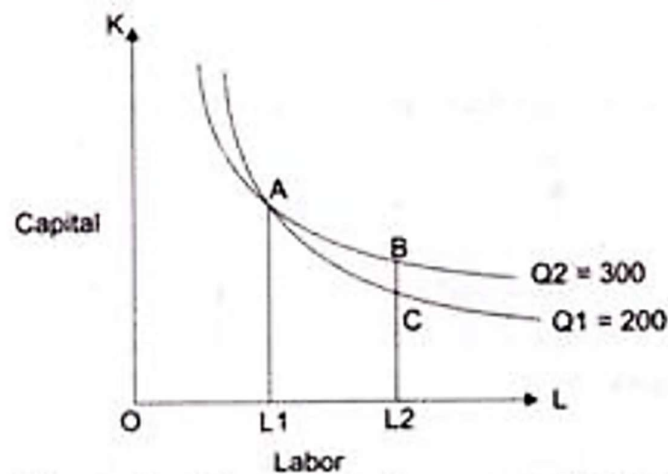


**Figure-5.5 the point where two isoquant curves meet**

At point A, the intersection of the two isoquant curves may be seen in Figure-. Point B lies on the isoquant curve when the quantity of output (Q2) is 300, whereas point C lies on the isoquant curve where the quantity of output (Q1) is 200. Both points B and C are reached with the same amount of labour, OL2. However, the capital differs between point B, which is denoted as BL2, and point C, which is denoted as CL2. A serves as the shared point of isoquant for both B and C points. According to the definition of isoquant, the output generated at point A is equal to the output produced at sites B and C. The output generated at points A and C on isoquant curve Q1 is 200, whereas on isoquant curve Q2, the output at points A and B is 300.

The following formula is used to equate the input at point B and C:

$$OL_2 + BL_2 = OL_2 + CL_2$$

$$BL_2 = CL_2$$

However, Figure-5 indicates that BL2 is greater than CL2. However, the intersection of two isoquants suggests that BL2 and CL2 are equal in terms of their output, which is logically impossible. Thus, it is said that isoquant curves are incapable of intersecting, since this would render the law of production inapplicable.

**Upper isoquant has high output:**

The upper curve of the isoquant curve indicates a higher level of production compared to the curve below. This is due to the greater combination of input, resulting in a higher output compared to the curve that is below it. For instance, in Figure-5, the capital value at point B surpasses the capital value at point C. Thus, the output of curve Q2 exceeds the output of Q1.

The Marginal Rate of Technical Substitution refers to the rate at which one input may be substituted for another input while keeping the level of output constant.

Marginal Rate of Technical Substitution (MRTS) is the quantity of one input (capital) that is reduced to increase the quantity of the other input (L), so that the output remains constant.

**Table displays the marginal rate of technological substitution.**

| Table-5: MRTS of L for K |         |         |        |                 |
|--------------------------|---------|---------|--------|-----------------|
| Combination              | Input L | Input K | Output | MRTS of L for K |
| P                        | 1       | 15      | 150    | —               |
| Q                        | 2       | 11      | 150    | 4:1             |
| R                        | 3       | 8       | 150    | 3:1             |
| S                        | 4       | 6       | 150    | 2:1             |
| T                        | 5       | 5       | 150    | 1:1             |

This table-5 displays the amount of labour needed to substitute one unit of capital while maintaining the same output for various combinations of capital and labour, which is 150.

For such a scenario, the calculation of MRTS may be determined using the following formula:

$$MRTS = \Delta K / \Delta L$$

Where,  $\Delta K$  = Change in Capital

$\Delta L$  Change in Labour

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## 5.8 SUMMARY

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This unit examined the production function in both the short run and the long run. In the short run, output varies when one input, typically labor, changes while others remain fixed, with key concepts including total product, marginal product, and average product. The law of diminishing returns explains the eventual decline in marginal product as more units of the variable input are added. In the long run, all inputs are adjustable, allowing firms to modify labor, capital, and other resources, with returns to scale categorized as increasing, constant, or decreasing describing how output responds to proportional input changes. Technological advancements significantly impact productivity and can shift the production function. Isoquant and isocost analysis help determine the most cost-effective input combinations, where isoquants depict different input combinations yielding the same output, and isocost lines represent input combinations with the same cost. The optimal input mix is achieved where an isoquant is tangent to an isocost line. Understanding the production function in both time frames is essential for effective production planning, resource allocation, and cost management, providing a framework for analyzing how firms produce goods and services, integrate technological improvements, and adapt to market dynamics.

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## 5.9 GLOSSARY

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- **Production Function:** The relationship between inputs and the maximum output that can be produced with those inputs.
- **Short-Run Production:** Period in which at least one input is fixed.
- **Long-Run Production:** Period in which all inputs can be varied.
- **Law of Diminishing Returns:** As additional units of a variable input are added to fixed inputs, the marginal product of the variable input eventually declines.

- **Returns to Scale:** The rate at which output increases as inputs are increased proportionately.
- **Isoquants:** Curves that represent all the combinations of inputs that produce the same level of output.
- **Isocost Lines:** Lines representing all combinations of inputs that cost the same amount.
- **Economies of Scale:** Reductions in average cost as the scale of production increases.
- **Diseconomies of Scale:** Increases in average cost as the scale of production increases.

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## 5.10 EXERCISES

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1. Define the production function and explain its significance in the short run and long run.

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2. Describe the law of diminishing returns and its implications for production in the short run.

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3. What are returns to scale? Explain the differences between increasing, decreasing, and constant returns to scale.

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4. How do isoquants and isocost lines help in determining the optimal combination of inputs?

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5. Discuss the impact of production functions on short-run and long-run costs.

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## 5.11 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2018). *Microeconomics* (9th ed.). Pearson.

3. Samuelson, W. F., & Marks, S. G. (2014). *Managerial Economics* (8th ed.). Wiley.

### Journal Articles

4. Diewert, W. E. (1971). "An Application of the Shephard Duality Theorem: A Generalized Leontief Production Function." *Journal of Political Economy*, 79(3), 481-507.

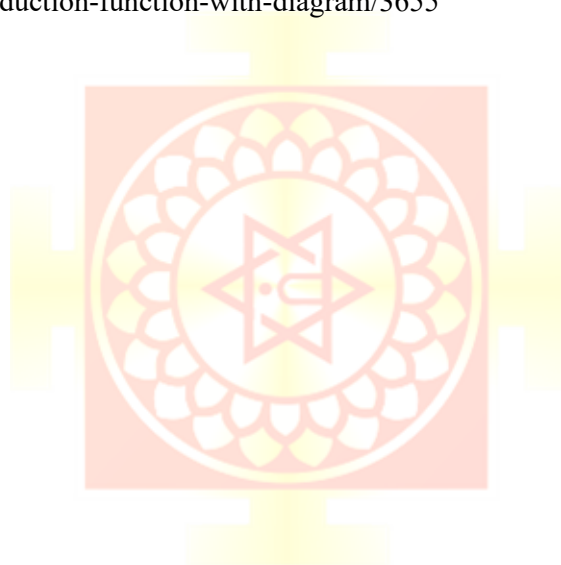
5. Kumbhakar, S. C., & Lovell, C. A. K. (2000). *Stochastic Frontier Analysis*. Cambridge University Press.

6. <https://www.economicsdiscussion.net/production/long-run-production-function-with-diagram/3655>

7. <https://www.tutorchase.com/notes/cie-a-level/economics/7-5-1-short-run-production-function>

8. <https://www.toppr.com/guides/economics/production-and-costs/production-function/>

9. <https://www.economicsdiscussion.net/production/long-run-production-function-with-diagram/3655>





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## **UNIT 6: THEORIES OF PRODUCTION, LAW OF VARIABLE PROPORTIONS AND RETURNS TO SCALE, ISOQUANTS, SCALE LINE, RIDGE LINES, ELASTICITY OF SUBSTITUTION**

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### **STRUCTURE**

- 6.1 Introduction
- 6.2 Objectives
- 6.3 Theories of Production
  - 6.3.1 Meaning and Concept
- 6.4 Law of Variable Proportions
  - 6.4.1 Definition
  - 6.4.2 Stages
- 6.5 Returns to Scale
  - 6.5.1 Definition
  - 6.5.2 Types
- 6.6 Isoquants
  - 6.6.1 Meaning and Characteristics
  - 6.6.2 Types of Isoquants
- 6.7 Scale Line & Ridge Lines
- 6.8 Elasticity of Substitution
- 6.9 Summary
- 6.10 Glossary
- 6.11 Exercises
- 6.12 Suggested Readings

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### **6.1 INTRODUCTION**

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The analysis of production plays a key role in understanding how businesses function, make strategic choices, and adapt to shifts in resource availability and technological advancement. This unit explores fundamental and advanced elements of production theory. It begins with basic concepts and progresses to more detailed topics such as the Law of Variable Proportions and Returns to Scale. The Law of Variable

Proportions—commonly referred to as the Law of Diminishing Marginal Returns focuses on how output is affected when one input changes while others remain fixed, offering insights into resource efficiency. In contrast, Returns to Scale evaluates how output responds when all inputs are increased proportionally, shedding light on production efficiency at various operational levels. To support this understanding, tools like isoquants are introduced. These curves represent different input combinations that generate the same output, helping visualize trade-offs and substitution between resources. The unit also explains scale lines, which show the output corresponding to varying input ratios, and ridge lines, which define the efficient boundaries of input combinations. Another key concept, elasticity of substitution, measures the ease with which one input can be replaced by another, reflecting the adaptability of the production process. By studying these topics in depth, learners gain valuable insights into how firms optimize production and allocate resources. This knowledge forms a critical foundation for more advanced economic analysis and practical decision-making in business and management settings.

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## **6.2 OBJECTIVES**

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After studying this unit, you will be able to:

1. Explain the basic theories of production.
2. Describe the Law of Variable Proportions and its phases.
3. Understand the concept of Returns to Scale.
4. Illustrate the characteristics and types of Isoquants.
5. Comprehend the significance of Scale Lines and Ridge Lines.
6. Calculate and interpret the Elasticity of Substitution.

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## 6.3 THEORIES OF PRODUCTION

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Production theory in economics elucidates the principles guiding a business's decision-making process about the quantity of each item it sells and produces, as well as the amount of fixed capital, labour, and raw materials it uses. It establishes the connections between the pricing of goods and resources, and the quantity of these goods and resources that are produced.

### 6.3.1 Meaning and Concept

**Production Theory:** Production theory is a core area of microeconomics that focuses on the process by which firms convert inputs (such as labor, capital, and raw materials) into outputs (goods and services). This theory is essential for understanding how firms operate, how they make decisions about the allocation of resources, and how they respond to changes in input costs and technological advancements. By analyzing production processes, economists can gain insights into the efficiency and profitability of firms, as well as the overall dynamics of the economy.

#### Concept

Production is the act of merging several inputs in order to create an output that can be used or consumed. Production refers to the process of generating goods or services that enhance the usefulness or satisfaction of persons.

Put simply, it is a procedure where the inputs are transformed into outputs.

#### Function

The production function represents the technological connection between the physical inputs and outputs of a company, based on a certain level of technology.

$$Q = f(a, b, c, \dots, z)$$

Where, a, b, c, .... z represents different inputs such as land, labour, money, etc. Q represents the magnitude of the production produced by a business.

If just labour (L) and capital (K) are considered as input components, the production function simplifies to

$$Q = f(L, K)$$

The production function is a mathematical representation of the connection between the inputs and outputs of a technological process. It is a tool that analyses the qualitative link between input and output, and also symbolises the technology of a business or the whole economy.

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## 6.4 LAW OF VARIABLE PROPORTIONS

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Production analysis focuses on the utilization of resources such as land, labour, and money to create a company's end product. The production of these items involves categorizing the fundamental ingredients into two categories –

### **Input variables:**

Variable inputs refer to inputs that may fluctuate or vary in both the short run and the long run.

### **Fixed Inputs**

Fixed inputs refer to inputs that stay constant in the near term.

### **Law of Variable Proportions**

The Law of Variable Proportions, also referred to as the Law of Diminishing Returns, states that when the quantity of one input increases while keeping all other inputs fixed, its marginal product will eventually decline. Initially, the marginal product may rise, but after a certain point, it starts to decrease and can even become negative if the variable input becomes excessive.

### **Assumptions of the Law**

This law applies under specific conditions that define its relevance in the short run. The key assumptions include:

1. **Fixed Technology:** The production technology remains constant during the short run period under consideration. This means that the methods and processes used for production do not change.
2. **Fixed Period:** The law applies over a fixed period, during which at least one input is fixed in quantity. For example, in agricultural production, the land area may be fixed while labor and capital are variable.
3. **Homogeneous Units:** The units of the variable input (like labor or capital) are homogeneous, meaning they are identical in terms of skills, efficiency, and quality.
4. **Fixed Proportions:** The proportions in which different inputs are combined remain fixed. For instance, if a farm uses two units of labor for every unit of land, this ratio remains unchanged.
5. **Short Run Analysis:** It applies to the short run, where at least one input is fixed, preventing firms from adjusting production capacity fully.

These assumptions help to simplify the analysis of production processes and illustrate how increasing the use of a variable input (like labor or capital) within the constraints of fixed inputs can lead to diminishing marginal returns after a certain point.

**Exemplification of the Legal Principle:** The Law of Variable Proportions is illustrated in the following table and diagram. Suppose a fixed plot of land is used for wheat cultivation while the amount of labor applied to it increases.

| Labour units | Aggregate Output | Marginal product | average product |
|--------------|------------------|------------------|-----------------|
| 1            | 2                | 2                | 2               |
| 2            | 6                | 4                | 3               |
| 3            | 12               | 6                | 4               |

|   |    |    |     |
|---|----|----|-----|
| 4 | 16 | 4  | 4   |
| 5 | 18 | 2  | 3.6 |
| 6 | 18 | 0  | 3   |
| 7 | 14 | -4 | 2   |
| 8 | 8  | -6 | 1   |

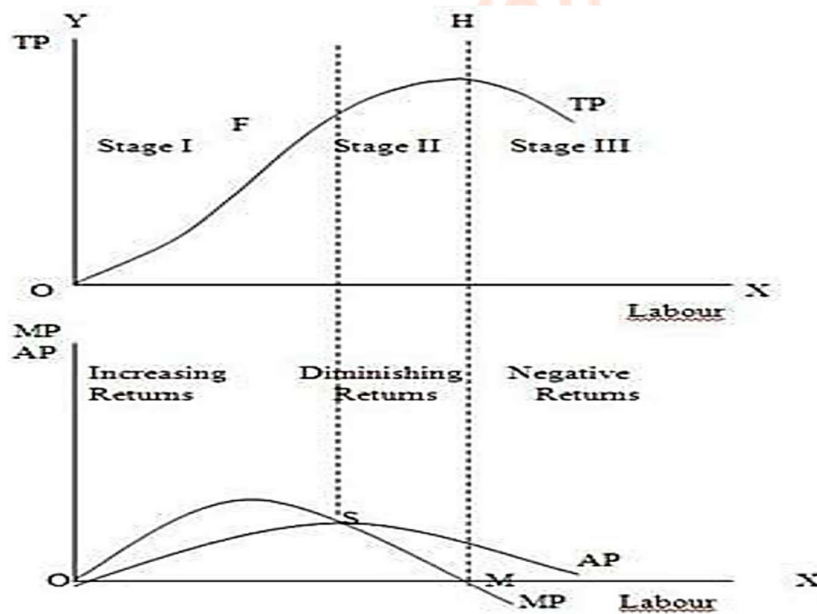


**Fig.6.1 Law of Variable Proportions: Labour Input and Output Relationship**

The Law of Variable Proportions can be categorized into three different phases. These stages are illustrated in the figure 6.1, where labor is plotted on the X-axis and output on the Y-axis.

## 6.5 RETURNS TO SCALE

**Stage I:** This initial phase is characterized by a steady rise in total output as more units of a variable input (like labor) are introduced. During this stage, the fixed factors of production are utilized more effectively, resulting in enhanced productivity. On a graph, the Total Product (TP) curve ascends from the origin up to point F, where it shows an increasing slope indicating a concave upward shape. This implies that the Marginal Product (MP) of

labor is on the rise. The TP curve eventually reaches a point of inflection where its rate of increase slows down. At this inflection point, the MP of labor is at its maximum before beginning to decline. This stage is referred to as the stage of increasing returns, as the Average Product (AP) of labor continues to climb. The stage concludes when the AP curve peaks.

**Stage II:** In the second phase, the total output continues to grow but at a diminishing rate, reaching its maximum at point H. During this period, both the MP and AP of labor decline, although they remain above zero. This behavior reflects the growing imbalance between the fixed and variable inputs, where the fixed factor starts to become a limiting constraint. The stage ends at point M, where the MP of labor falls to zero, and the TP curve hits its peak. This stage is critical for businesses, as it represents the most efficient range of production. Operating within this stage ensures positive, albeit diminishing, returns while avoiding the inefficiencies associated with overuse of variable inputs.

**Stage III:** In this final stage, the total output starts to decline, shown by a downward-sloping TP curve. As a result, the MP of labor turns negative, with the MP curve dipping below the horizontal axis. Here, the amount of variable input (e.g., labor) exceeds the optimal level in relation to the fixed input, causing a drop in efficiency. Adding more labor leads not only to reduced total output but also to increased production costs. Therefore, this stage is considered unproductive and economically unsustainable for firms.

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## 5.5 RETURNS TO SCALE

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Returns to Scale explore how a firm's output responds when all production inputs are increased by the same proportion. This concept is essential for understanding the efficiency and productivity of a firm as it grows in size.

### 1.5.1 Definition

Returns to Scale describe the relationship between a uniform increase in all inputs and the resulting change in output. It examines whether



production becomes more or less efficient as a firm scales up its use of resources.

### 1.5.2 Types of Returns to Scale

Returns to Scale can be classified into three main categories:

1. **Increasing Returns to Scale:** This situation arises when the output expands by a greater proportion than the increase in inputs. For instance, if all inputs are doubled and output more than doubles, the firm is experiencing increasing returns to scale. This often results from efficiencies gained through factors like greater specialization of labor, bulk purchasing of inputs, or better use of capital and technology. These advantages enable firms to reduce average costs as production expands.

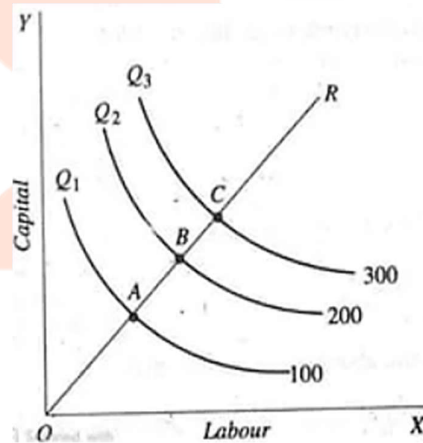


**Fig.6.2 Increasing Returns to Scale**

**Constant Returns to Scale:** This type of return occurs when a proportional increase in all inputs leads to an exactly proportional increase in output. For example, if all inputs are doubled, the resulting output also doubles. Under constant returns to scale, the firm's average cost of production stays the same, regardless of its scale. Such outcomes are typically observed in industries where the production process remains consistent and does not gain significant advantages or face drawbacks from scaling operations.

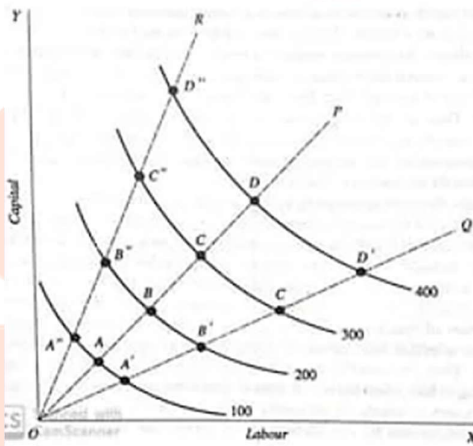


**Fig.6.3 Constant Returns to Scale**

1. **Decreasing Returns to Scale:** This occurs when increasing all inputs by a certain proportion result in a less than proportionate increase in output. For example, doubling inputs leads to less than double the output. Decreasing returns to scale typically arise due to inefficiencies that emerge as production scales up, such as managerial issues, logistical challenges, or diminishing marginal returns to labor or capital. In such cases, average costs increase as production expands.

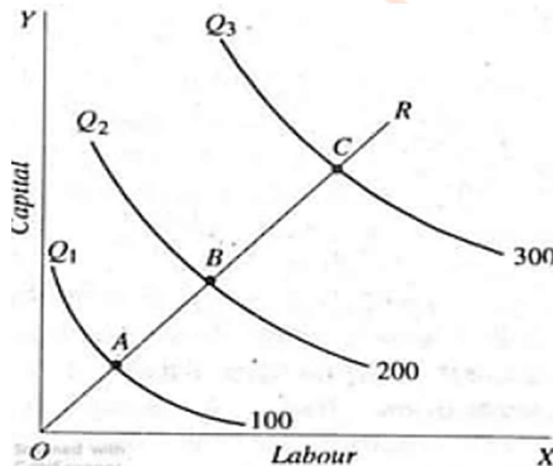


**Fig.6.4 Decreasing Returns to Scale**

Understanding returns to scale helps firms make strategic decisions about production levels, pricing strategies, and cost management, depending on how their production processes respond to changes in scale.

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## 6.6 ISOQUANTS

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### Meaning and Characteristics

Isoquants play a vital role in production theory within microeconomics, illustrating different combinations of inputs that produce the same level of output. The term "isoquant" is derived from "iso," meaning equal, and "quant," referring to quantity. An isoquant is a curve that represents equal levels of output. A series of iso-product curves, also known as isoquants or production indifference curves, can be used to illustrate a production function involving two variable inputs that can be substituted for each other within certain limits.

Isoquants serve as graphical representations of input combinations that yield a specific level of output. Each point on the isoquant corresponds to a distinct combination of inputs producing the same output. By analyzing these curves, firms can determine optimal input utilization to maximize efficiency and minimize costs.

$$Q = f(L, K)$$

Output (Q) is determined by the quantities of two inputs, labor (L) and capital (K).

An isoquant represents the many permutations of two inputs that may produce the same degree of output. Since each combination produces the same product, the producer gets apathetic towards these possibilities.

Here's an explanation of its components:

1. Isoquants, also referred to as equal product curves, represent various input combinations, such as labor and capital, that result in the same level of output. They demonstrate how inputs can be exchanged while maintaining constant production. The slope of an isoquant indicates the marginal rate of technical substitution (MRTS), which measures

the amount of one input that can be decreased when another is increased, ensuring output, remains unchanged.

**Types of Isoquants:** Isoquants can vary based on the type of production technology:

- **Convex Isoquants:** Most common, indicating diminishing MRTS as inputs are substituted.
- **Linear Isoquants:** Rare, suggesting perfect substitutability between inputs.
- **Concave Isoquants:** Least common, showing increasing MRTS as inputs are substituted.

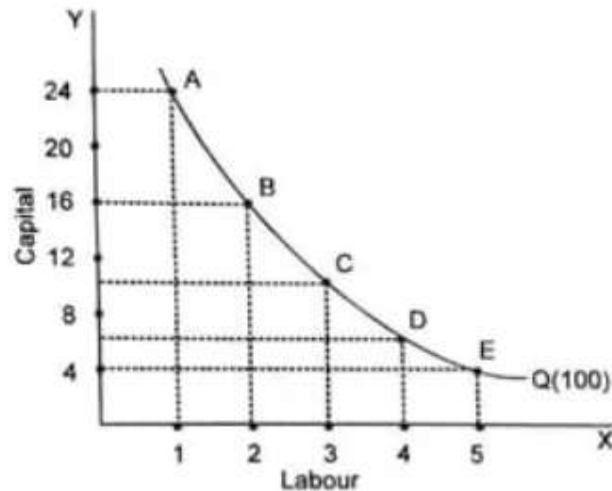


**Fig.6.5 Isoquants curve**

#### **Assumptions**

1. The elements of production are limited to two: labour and capital.
2. The two components may mutually replace each other within a certain threshold.
3. The shape of an isoquant depends on the extent to which the two inputs can be substituted for each other

4. The technology is provided or transferred gradually over a certain duration.

Scale lines and ridge lines are concepts related to isoquants in production theory.

### Check Your Progress

1. Explain the Law of Variable Proportions and its three stages.

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2. Distinguish between increasing, constant, and decreasing returns to scale.

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## 6.7 SCALE LINE & RIDGE LINES

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### Scale Line:

**Definition:** A scale line, or isocost line, illustrates all possible input combinations that can be acquired for a specific total expenditure.

### Characteristics:

A scale line is parallel to the axes representing input factors such as labor and capital, illustrating various input combinations that can be utilized without exceeding the allocated budget. It visually represents the cost constraint faced by firms in the production process. The distance between two scale lines indicates changes in total cost when input prices remain constant.

### Use:

Scale lines assist firms in identifying the most efficient input combination that maximizes output while staying within a fixed

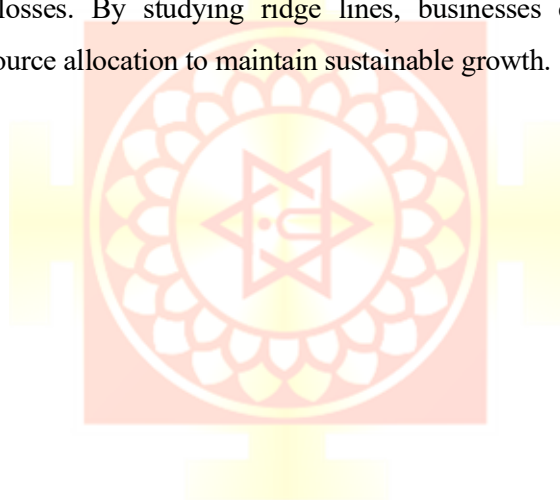
budget. Their intersection with isoquants indicates the points of cost minimization. By analyzing these intersections, firms can adjust their resource allocation to enhance productivity. This helps businesses achieve cost efficiency while maintaining optimal production levels.

**Ridge Lines:** Ridge lines, also known as iso-revenue or iso-profit lines, represent different input combinations that result in the same revenue or profit level. These lines define the boundaries within which the marginal productivity of inputs remains positive. Beyond these boundaries, additional input usage leads to inefficiencies and diminishing returns.

**Characteristics:**

Similar to isoquants, ridge lines are generally convex, indicating various input combinations that produce a constant revenue level. Their slope reflects the marginal rate of transformation (MRT) between inputs and outputs. Ridge lines also help in identifying the region where production remains economically viable. Points outside the ridge lines suggest inefficient resource utilization and higher costs.

**Use:** Ridge lines help businesses optimize profitability by determining the input combinations that yield the highest revenue or profit, considering production technology and output pricing. They enable firms to avoid unnecessary input expansion that leads to losses. By studying ridge lines, businesses can strategize resource allocation to maintain sustainable growth.



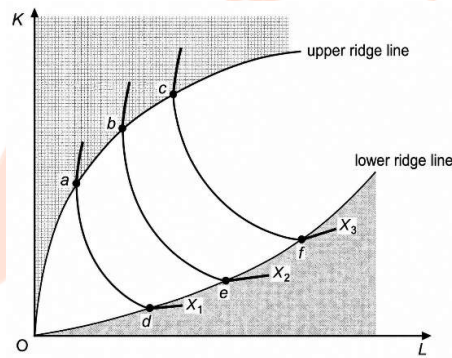


**Fig.6.6 Ridge Lines**

### **Relationship to Production Theory:**

Both scale lines and ridge lines are crucial in production theory as they assist firms in making decisions regarding input combinations and cost minimization. They provide graphical representations of the trade-offs between inputs and outputs, facilitating efficient production and profit maximization strategies. Understanding these concepts is essential for analyzing production possibilities and making informed managerial decisions in various economic contexts.

## **6.8 ELASTICITY OF SUBSTITUTION**

The concept of elasticity of substitution in microeconomics evaluates how easily one input can replace another in the production process while keeping output constant.

### **Definition:**

Elasticity of substitution measures the degree to which the proportion of two inputs (such as capital and labor) adjusts in response to changes in their relative prices. It indicates the flexibility of substituting one input for another without altering the total production level.

### **Formula:**

The elasticity of substitution is mathematically expressed as:

( $\sigma$ ) is mathematically expressed as:

$$\sigma = \frac{d(\ln(\text{ratio of inputs}))}{d(\ln(\text{relative price of ratio}))}$$



Where:

- $\ln$  denotes the natural logarithm,
- Ratio of inputs is the ratio of input quantities used in production,
- Relative price ratio is the ratio of input prices.

**Interpretation:**

**High Elasticity (Substitutability):** If  $\sigma > 1$ , inputs are considered highly substitutable. This means firms can easily switch between inputs in response to changes in their relative prices without significantly affecting output.

**Low Elasticity (Complementary):** If  $\sigma < 1$ , inputs are less substitutable or complementary. Changes in relative prices lead to smaller adjustments in input ratios, indicating a higher dependence on both inputs to maintain output levels.

**Importance:**

Understanding the elasticity of substitution helps firms optimize production processes by making efficient choices between inputs. It also informs economic policies and industrial strategies by predicting how changes in input prices affect production costs and output levels.

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## 6.9 SUMMARY

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We studied the basic theories of production in this unit, emphasizing returns to scale and the Law of Variable Proportions. We looked at the many phases of production efficiency and the effects of varied input levels on output. Additionally, the unit created analytical tools such as Scale Lines, which aid in visualizing changes in production scale, and Isoquants, which depict many combinations of inputs that produce the same outcome. In order to comprehend the limits of effective output, Ridge Lines were examined. We also looked at the idea of Elasticity of Substitution, which quantifies how simple it is to switch from one input to another in reaction to changes in input pricing. Understanding how producers allocate resources, optimise production processes, and adapt to fluctuating input costs all of which ultimately impact their strategic

and operational decisions requires an understanding of these ideas. When combined, these ideas and techniques provide a strong framework for examining economic decision-making and production efficiency in a variety of settings.

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## 6.10 GLOSSARY

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- **Production Function:** a mathematical connection that illustrates the highest amount of output that may be generated from various factor input combinations.
- **Law of Variable Proportions:** An economic concept that states that variations in output would gradually decrease when the amount of one input is changed while keeping other inputs constant.
- **Returns to Scale:** The rate at which output increases in response to a proportional increase in all inputs. Can be increasing, constant, or decreasing.
- **Isoquant:** A curve that represents all the combinations of inputs that produce the same level of output.
- **Scale Line:** A graphical representation showing the effects of scale changes on output levels, often used to illustrate returns to scale.
- **Ridge Lines:** Boundaries on an isoquant map beyond which no further efficient production is possible.
- **Elasticity of Substitution:** an indicator of how simple it is to switch out one input for another throughout the manufacturing process.
- **Marginal Product:** The additional output produced by using one more unit of a particular input, holding all other inputs constant.
- **Total Product:** The total quantity of output produced with a given quantity of inputs.
- **Average Product:** The output produced, on average, by each unit of input.

- **Diminishing Returns:** A principle stating that as more of one input is added, holding other inputs constant, the additional output will eventually decrease.
- **Technical Efficiency:** A situation in which a firm produces the maximum output from a given set of inputs.
- **Economic Efficiency:** Achieving the maximum output with the least cost combination of inputs, considering both input prices and technological capabilities.
- **Optimal Input Combination:** the combination of inputs that, when taking production technology and input costs into account, yields the lowest cost for a given level of output.

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## 6.11 EXERCISES

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1. Explain the Law of Variable Proportions and its three phases.

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2. Differentiate between increasing, constant, and decreasing returns to scale.

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3. Describe the characteristics of Isoquants and their significance in production analysis.

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4. What is the Elasticity of Substitution, and how is it calculated?

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5. Discuss the importance of Ridge Lines in the context of production efficiency.

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## 6.12 SUGGESTED READINGS

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- Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach. W.W. Norton & Company.
- Samuelson, P. A., & Nordhaus, W. D. (2010). Economics. McGraw-Hill Education.
- Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics. Pearson Education.
- Mankiw, N. G. (2014). Principles of Microeconomics. Cengage Learning.
- Nicholson, W., & Snyder, C. (2016). Microeconomic Theory: Basic Principles and Extensions. Cengage Learning.
- Jehle, G. A., & Reny, P. J. (2011). Advanced Microeconomic Theory. Pearson Education.
- Schaum's Outline of Microeconomic Theory (4th Edition) by Dominick Salvatore
- Hirschey, M. (2009). Fundamentals of Managerial Economics. Cengage Learning.
- Besanko, D., & Braeutigam, R. R. (2011). Microeconomics. Wiley.
- <https://www.slideshare.net/slideshow/theories-of-production-economicspptx/265009355>
- [https://www.tutorialspoint.com/managerial\\_economics/theory\\_of\\_production.htm](https://www.tutorialspoint.com/managerial_economics/theory_of_production.htm)
- <https://jiwaji.edu/pdf/ecourse/commerce/unit-2%20Production%20function%20and%20Law%20of%20variable%20proportion.pdf>

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## **UNIT-7: EQUILIBRIUM OF THE FIRM, COBB-DOUGLAS, AND CES PRODUCTION FUNCTION**

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### **STRUCTURE**

- 7.1 Introduction
- 7.2 Objectives
- 7.3 Equilibrium of The Firm
- 7.4 Cobb-Douglas Production Function
  - 7.4.1 Meaning and Concept
  - 7.4.2 Drawbacks of the C-D Production Function
  - 7.4.3 Importance of this law
- 7.5 CES Production Function
  - 7.5.1 Meaning and Concept
  - 7.5.2 The characteristics of this law
  - 7.5.3 Advantages of the C.E.S. Production Function
- 7.6 Comparison between CES function and CD function
- 7.7 Summary
- 7.8 Glossary
- 7.9 Exercises
- 7.10 Suggested Readings

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### **7.1 INTRODUCTION**

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In this unit, we delve into the fundamental concepts of firm equilibrium, the Cobb-Douglas production function, and the Constant Elasticity of Substitution (CES) production function. Understanding the equilibrium of a firm is crucial in microeconomic theory as it explains how firms determine the optimal level of output and input usage to maximize profits or minimize costs. The Cobb-Douglas production function is a widely used mathematical representation of the relationship between inputs (such as labor and capital) and output in production processes. It showcases constant returns to scale and the substitutability between inputs. The CES production function extends this idea by allowing for

varying degrees of substitutability between inputs, making it more flexible in analyzing different production scenarios. This unit will explore the theoretical underpinnings, mathematical formulations, and practical implications of these production functions. By examining these concepts, we aim to provide a comprehensive understanding of how firms operate under different technological conditions and how they respond to changes in input prices and market conditions. This exploration is essential for grasping more complex economic models and for applying economic theory to real-world business and policy-making decisions. The unit will also address the limitations and assumptions underlying these models, ensuring a critical perspective on their applicability and relevance in various economic contexts.

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## **7.2 OBJECTIVES**

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By the end of this unit, you will be able to

1. Understand the concept of equilibrium of the firm and its conditions.
2. Explain the Cobb-Douglas production function and its properties.
3. Understand the CES production function and its characteristics.
4. Compare and contrast the Cobb-Douglas and CES production functions.

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## **7.3 EQUILIBRIUM OF THE FIRM**

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Equilibrium of the firm refers to the state where a firm maximizes its profit, given its production costs and market conditions. This occurs when the firm's marginal cost (MC) equals its marginal revenue (MR). Understanding firm equilibrium is crucial in analyzing how firms make decisions about output levels, pricing, and resource allocation in different market structures.



## Key Concepts

### 1. Firm Equilibrium Definition:

A firm is in equilibrium when  $MC=MR$ , meaning the firm has no incentive to change its output level as it is maximizing profit.

### 2. Perfect Competition:

**Characteristics:** Many sellers, homogeneous products, free entry/exit.

**Short-Run Equilibrium:** Firms can make profits or losses. Equilibrium is where  $P=MC$ .

**Long-Run Equilibrium:** Firms make normal profits due to free entry/exit. Equilibrium is where  $P=MC=AC$ .

### 3. Monopoly:

**Characteristics:** Single seller, high market power, no close substitutes, high barriers to entry.

**Profit Maximization:** Monopolist sets output where  $MR=MC$  and charges a higher price based on demand.

### 4. Monopolistic Competition:

**Characteristics:** Many sellers, differentiated products, some market power, free entry/exit.

**Equilibrium:** In the short run, firms may make profits or losses. In the long run, they make normal profits due to free entry/exit. Equilibrium is where  $MR=MC$ .

### 5. Oligopoly:

**Characteristics:** Few dominant sellers, interdependent decision-making.

**Kinked Demand Curve Model:** Price rigidity occurs due to competitors' reactions. Equilibrium is stable despite changes in MC.

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## 7.4 COBB-DOUGLAS PRODUCTION FUNCTION

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### 7.4.1 Meaning and Concept

The Cobb-Douglas production function is derived from the empirical analysis conducted by Paul H. Douglas and C.W. Cobb on the American

manufacturing sector. The production function for the manufacturing industry is a linear homogeneous function of degree one that considers two inputs, labour and capital, for the total output.

The Cobb-Douglas production function is mathematically represented as:

$$Q = AL^aK^\beta$$

Q represents the output, whereas L and K represent the inputs of labour and capital, respectively. A, a, and  $\beta$  are positive parameters, where a is more than zero and  $\beta$  is greater than zero. The equation states that the output is directly influenced by the variables L and K. Any portion of the output that cannot be accounted for by L and K is attributed to the variable A, which is often referred to as the "residual" or technical change. The Cobb-Douglas production function attributes 1/4 of the growth in the manufacturing sector to capital and 3/4 to labour.

$$Q = AL^{\frac{3}{4}}K^{\frac{1}{4}}$$

This demonstrates constant returns to scale since the sum of the values of L and K is equal to one:  $(\frac{3}{4} + \frac{1}{4})$ , or  $(a + \beta = 1)$ . The coefficient of labour in the C-D function quantifies the percentage increase in output (Q) that would occur from a 1 percent increase in labour (L), while keeping capital (K) unchanged.

Similarly,  $\beta$  represents the percentage increase in Q that would occur if K were to grow by 1 percent, while keeping L unchanged. Figure 20 illustrates the C-D production function, which exhibits constant returns to scale. The horizontal axis represents the amount of labour input, while the vertical axis represents the amount of capital.

To produce a total output of 100 units, a specific combination of OK units of capital and OL units of labor is utilized. To raise the output to 200 units, both labor and capital inputs must be doubled. In this scenario,

the value of OK2 is exactly twice that of OK1, and OL2 is twice the value of OL1.

Similarly, in order to grow the production three-fold to 300, the quantities of labour and capital will need to be tripled. OK3 and OL3 are three times the size of OK1 and OL1, respectively. An alternative approach involves using the scale line or expansion route that connects the equilibrium points Q, P, and R. The operating system (OS) serves as the connecting line or pathway that links these places on a scale or expansion.

The isoquants 100, 200, and 300 are evenly spaced. Therefore, on the operating system scale, it is seen that  $OQ = QP = PR$ , indicating that when both capital and labour are added in equal measures, the output likewise grows proportionally.

#### **7.4.2 Drawbacks of the C-D Production Function:**

Arrow, Chenery, Minhas, and Solow have attacked the C-D production function, as outlined below:

1. The C-D production function only examines labour and capital as inputs, disregarding crucial factors such as raw materials that are used in the manufacturing process. Hence, it is not feasible to extend this function to include more than two inputs.
2. In the C-D production function, the problem of measurement of capital arises because it takes only the quantity of capital available for production. But the full use of the available capital can be made only in periods of full employment. This is unrealistic because no economy is always fully employed.

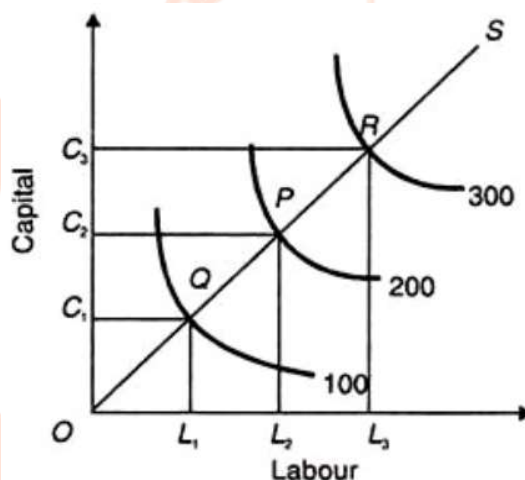


**Fig.7.1 Cobb-Douglas Production Function**

3. The C-D production function is critiqued for exhibiting consistent returns to scale. However, consistent returns to scale do not exist, since both growing and decreasing returns to scale may be applied to production.

It is impracticable to achieve a proportional change in the outputs of all industries by altering all inputs. Certain inputs are limited and cannot be expanded to the same extent as ones that are plentiful. However, inputs such as machinery and entrepreneurship are inseparable. As the utilization of indivisible elements reaches their full capacity, the per unit cost decreases as production grows.

In cases where resources are limited and inputs are indivisible, achieving continuous returns to scale in the Cobb-Douglas production function becomes impractical. As input quantities increase during the production process, the combined effect of economies of scale and specialization leads to a more than proportional rise in output, referred to as increasing returns to scale.

In practice, entrepreneurs do not necessarily increase all input factors proportionally to achieve a corresponding rise in output. Instead, they seek to attain a greater-than-proportional increase in production while recognizing the potential for diminishing returns to scale.

4. Additionally, the Cobb-Douglas production function assumes that inputs can be substituted for one another, overlooking the possibility that certain factors may complement each other in the production process.

5. This function relies on the assumption of perfect competition in the factor market, which is not practical. However, if we abandon this assumption, the coefficients  $\alpha$  and  $\beta$  no longer reflect factor shares.

6. The C-D function has a flaw known as the aggregation issue. This issue emerges when this function is implemented for each individual business within an industry, as well as for the industry as a whole. In this scenario, there will be several production functions with varying levels of aggregation, either low or high. Therefore, the C-D function fails to accurately measure its intended target.

Therefore, the feasibility of implementing the C-D production function in the manufacturing business is questionable. This principle does not apply to agriculture, since increasing the amounts of inputs used for intensive cultivation will not result in a proportional increase in production. Nevertheless, it is indisputable that consistent returns to scale represent a phase in the growth of a business, sector, or economy. It is significance noting that this stage may occur at a later time and only last for a little period.

#### **7.4.3 Importance of this law**

Not with standing these concerns, the C-D function has significant value.

1. It has been extensively used in empirical research on manufacturing sectors and for making comparisons across different industries.
2. It is used to ascertain the proportionate contributions of labour and capital to the overall production.
3. It is used to demonstrate Euler's Theorem.
4. The parameters  $a$  and  $b$  in this context reflect elasticity coefficients that are used for making comparisons across different sectors.

5. The production function exhibits linear homogeneity of degree one, indicating constant returns to scale. If the sum of  $\alpha$  and  $\beta$  is equal to 1, then there are growing returns to scale. Conversely, if the sum of  $\alpha$  and  $\beta$  is less than 1, then there are declining returns to scale.
6. Economists have expanded the use of this production function to include more than two variables.

### Check Your Progress

1. What is meant by equilibrium of the firm? State its main condition.

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2. What is the Cobb-Douglas production function? Mention its main features.

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## 7.5 THE CES PRODUCTION FUNCTION

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Arrow, Chenery, Minhas, and Solow introduced the Constant Elasticity of Substitution (CES) function in their renowned 1961 work. This function comprises three variables: Q, C, and L, as well as three parameters: A, and.

The expression may be written in the following format:

$$Q = A [aC^{-\theta} + (1-\alpha)L^{-\theta}]^{-1/\theta}$$

Q represents the whole production, C represents capital, and L represents labour. A represents the efficiency metric that reflects the current level of technology and organizational factors of production. Technological and organizational changes can cause a shift in the production function, with the efficiency parameter playing a key role. The distribution parameter,  $\alpha$  (alpha), is responsible for determining the

relative factor shares in the total output, while the substitution parameter,  $\theta$  And  $A > 0; 0 < \alpha < 1; > -1$

**The characteristics of this law:**

The CES production function has the following characteristics:

1. The CES function exhibits homogeneity of degree one. When the inputs C and L in the CES function are multiplied by a factor of n, the output Q will likewise be multiplied by the same factor of n.

Similar to the Cobb-Douglas production function, the CES function exhibits consistent returns to scale.

2. The CES production function exhibits homogeneity of degree zero in both the average and marginal products of the variables C and L, similar to other linearly homogeneous production functions.

3. Based on the aforementioned condition, it can be shown that the slope of an isoquant, which represents the marginal rate of technical substitution (MRTS) of capital for labour, is convex towards the origin.

4. The parameter ( $\theta$ ) in the CES production function governs the degree of substitutability. This function calculates the elasticity of substitution.

$$\sigma = \frac{1}{1} + \theta$$

This implies that the elasticity of substitution remains constant, with its value determined by the parameter  $\theta$ . If  $\alpha$  is zero, then the elasticity of substitution is equal to one. When  $\theta$  approaches infinity, the elasticity becomes zero, whereas if  $\theta$  is zero, the elasticity becomes infinite. This suggests that when the elasticity of substitution is equal to one, the CES production function simplifies into the Cobb-Douglas production function.

If  $\theta$  is less than zero, the elasticity of substitution is also negative. Similarly, if  $\theta$  is finite, the elasticity remains below one. The shape of isoquants in the CES production function varies from right angles to



straight lines, depending on whether the elasticity of substitution ranges from zero to infinity.

Therefore, if labor (L) and capital (K) are interchangeable, an increase in capital will lead to a decreased need for labor to maintain the same output level. As a result, the marginal productivity of labor (MP<sub>L</sub>) will rise. This means that the marginal product of one input increases as the quantity of the other input expands.

#### **Advantages of the C.E.S. Production Function:**

The CES function has the following merits:

1. The CES function is more encompassing.
2. The CES function encompasses all forms of returns.
3. The CES function considers many parameters.
4. The CES function considers raw materials as one of its inputs.
5. The estimation of the CES function is straightforward.
6. The CES function does not make unreasonable assumptions.

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## **7.6 COMPARISON BETWEEN CES FUNCTION AND CD FUNCTION**

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The CES function and the CD manufacturing function exhibit distinct disparities at their core.

1. The CD function relies on the fact that the pay rate remains constant in proportion to the production per person. Conversely, the CES function is derived from the fact that the amount of production per person varies in proportion to the wage rate.
2. The CES production function has more extensive characteristics compared to the CD production function, enabling elements to work as either replacements or complements. The CD function, however, relies on the premise of component substitutability and overlooks factor complementarity.

The CES production function is more versatile and can be applied in a wide range of scenarios.

3. Unlike the Cobb-Douglas (CD) production function, which is restricted to two inputs, the CES function can accommodate multiple inputs.
4. The CES function maintains a constant elasticity of substitution, which can take any value from zero to infinity. In contrast, the CD function is specifically associated with an elasticity of substitution equal to one. This makes the Cobb-Douglas function a special case of the CES function.
5. The CES function can represent different types of returns to scale, including constant, increasing, and decreasing returns, whereas the CD function is limited to representing only constant returns to scale.

**Constraints of CES Production Function:**

1. The CES production function primarily considers two inputs, though it can be extended to include more. However, incorporating additional inputs introduces significant mathematical complexity.
2. The distribution parameter, also known as the capital intensity factor ( $\alpha$ ), has a defined dimension and is not dimensionless.
3. When fitting data to the CES function, the efficiency parameter ( $A$ ) cannot be made independent of zero or the units used for output ( $Q$ ), capital ( $K$ ), and labor ( $L$ ).
4. While the CES function is useful for analyzing the production function of a single firm, it is not suitable for representing the aggregate production function of an entire industry. This raises challenges in aggregating multiple firms' production functions at the industry level.
5. A limitation of the CES function is that the elasticity of substitution between any set of inputs remains constant, which may not always align with real-world production scenarios.
6. Estimating the parameters of a CES production function presents several challenges, including selecting appropriate exogenous

variables, choosing an estimation method, and addressing issues such as multicollinearity.

7. Identifying the production function becomes difficult in the presence of technological advancements or changes.

Despite its limitations, the CES production function remains valuable for demonstrating Euler's theorem, explaining constant returns to scale, showing that the average and marginal products of capital and labor are homogeneous of degree zero, and determining the elasticity of substitution.

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## 7.7 SUMMARY

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This unit covered essential concepts related to firm equilibrium, the Cobb-Douglas production function, and the Constant Elasticity of Substitution (CES) production function. Firm equilibrium plays a crucial role in understanding how firms optimize their input and output decisions to either maximize profits or minimize costs. The Cobb-Douglas production function helped illustrate the relationship between inputs such as labor and capital, emphasizing constant returns to scale and input substitutability. Additionally, we explored the CES production function, which builds upon the Cobb-Douglas model by allowing for varying degrees of input substitution, making it a more adaptable tool for analyzing diverse production settings. Through an in-depth theoretical and mathematical examination, we developed a thorough understanding of how these production functions contribute to microeconomic analysis. We also explored their real-world applications, particularly how firms respond to shifts in input prices and market conditions. This unit highlighted the significance of these models in economic theory and practice while critically evaluating their underlying assumptions and limitations. By adopting a comprehensive approach, we gained valuable insights into how production functions shape firm strategies and influence economic policymaking.

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## 7.8 GLOSSARY

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- **Firm Equilibrium:** The condition in which a firm achieves maximum profit by producing the level of output where marginal cost equals marginal revenue.
- **Cobb-Douglas Production Function:** A mathematical model that describes the relationship between inputs and output, assuming constant returns to scale and predefined elasticities for labor and capital.
- **CES Production Function:** A production model that allows for varying degrees of input substitution, determined by the elasticity of substitution parameter.
- **Marginal Cost (MC):** The cost incurred when producing an additional unit of output.
- **Marginal Revenue (MR):** The additional income earned from selling one more unit of output.
- **Average Cost (AC):** The total cost of production divided by the total quantity of output produced.
- **Returns to Scale:** The proportionate change in output resulting from a proportional increase in all inputs.
- **Elasticity of Substitution:** A measure of how easily one input can be replaced by another in the production process.
- **Total Factor Productivity:** An indicator of how efficiently inputs are utilized in the production process.
- **Output Elasticity:** The percentage change in output due to a one-percent change in a given input.
- **Profit Maximization:** The strategy firms use to determine the optimal price and output levels that yield the highest profit.
- **Factor Substitution:** The practice of replacing one input with another in the production process to optimize efficiency.

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## 7.9 EXERCISES

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1. Define and explain the concept of firm equilibrium. How do firms achieve equilibrium in terms of output and input usage?

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2. Describe the Cobb-Douglas production function. What are its key characteristics, and how does it illustrate the relationship between inputs and output?

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3. Compare and contrast the Cobb-Douglas production function with the Constant Elasticity of Substitution (CES) production function. How does the CES function provide more flexibility in analyzing production processes?

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4. Discuss the practical implications of the Cobb-Douglas and CES production functions for firms in real-world markets. How do these functions influence firms' responses to changes in input prices and market conditions?

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5. Critically evaluate the assumptions and limitations of the Cobb-Douglas and CES production functions. How do these limitations affect the applicability of these models in economic analysis and policy-making?

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## 7.10 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2012). Microeconomics. Pearson Education.
2. Nicholson, W., & Snyder, C. (2016). Microeconomic Theory: Basic Principles and Extensions. Cengage Learning.
3. Mas-Colell, A., Whinston, M. D., & Green, J. R. (1995). Microeconomic Theory. Oxford University Press.
4. Koutsoyiannis, A. (1979). Modern Microeconomics. Macmillan.
5. Jehle, G. A., & Reny, P. J. (2011). Advanced Microeconomic Theory. Pearson Education.
6. Chambers, R. G. (1988). Applied Production Analysis: A Dual Approach. Cambridge University Press.

7. Ferguson, C. E., & Gould, J. P. (1975). Microeconomic Theory. Irwin.
8. Debertin, D. L. (2012). Agricultural Production Economics. Macmillan.
9. Samuelson, P. A., & Nordhaus, W. D. (2010). Economics. McGraw-Hill.
10. Blaug, M. (1992). The Methodology of Economics: Or, How Economists Explain. Cambridge University Press.
11. <https://www.economicsdiscussion.net/production-function/the-ces-production-function/18511>
12. <https://www.economicsdiscussion.net/production-function/the-cobb-douglas-production-function/18519>



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## UNIT 8: THEORIES OF COSTS: SHORT RUN AND LONG RUN COSTS

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### STRUCTURE

- 8.1 Introduction
- 8.2 Objectives
- 8.3 Theory of Costs
  - 8.3.1 Meaning and Concept
  - 8.3.2 Factors influencing cost
  - 8.3.3 Financial expenses
- 8.4 Short Run Cost
  - 8.4.1 fixed costs and variable costs
  - 8.4.2 Marginal Cost
- 8.5 Long Run Cost
  - 8.5.1 Long Run Average Cost Curve
  - 8.5.2 Long Run Marginal Cost Curve
- 8.6 Summary
- 8.7 Glossary
- 8.8 Exercises
- 8.9 Suggested Readings

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### 8.1 INTRODUCTION

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Unit 8, "Theories of Costs: Short-Run and Long-Run Costs," explores key concepts in cost analysis, focusing on how production costs change over different time periods. In the short run, firms encounter both fixed and variable costs, shaping distinct cost structures that influence decision-making. In contrast, the long run allows firms to adjust all inputs, making all costs variable and enabling them to benefit from economies of scale. This unit examines the derivation and significance of various cost curves, such as total, average, and marginal costs, and their role in maximizing profits. A clear understanding of cost behavior in both time frames helps in optimizing resource utilization and

formulating long-term business strategies. Emphasizing real-world applications, the unit equips students with the knowledge to analyze and manage costs effectively in practical business settings.

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## **8.2 OBJECTIVES**

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By the end of this unit, you will be able to:

1. Comprehend the nature and behavior of fixed and variable costs in the short run.
2. Study the derivation and significance of total, average, and marginal cost curves.
3. Understand how all costs become variable in the long run and the concept of economies of scale.
4. Learn to apply cost concepts to real-world business scenarios for effective decision-making.
5. Gain insights into how behavior influences long-term strategic planning cost and resource allocation.

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## **8.3 THEORY OF COSTS**

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### **8.3.1 Meaning and Concept**

Cost may be described as the financial worth of all the efforts and resources used in order to accomplish a goal, specifically in the context of producing products and services. Costs play a crucial role in the process of making business decisions. The cost of manufacturing sets the minimum price for a product. It assists managers in making accurate decisions, such as determining the appropriate price to quote, deciding whether to place specific orders for inputs, and determining whether to abandon or add a product to the current product line. Typically, cost refers to the monetary expenditures that a company incurs throughout the manufacturing process. The cost also included the imputed value of the entrepreneur's own resources and services, together with the income of the owner-manager.

### 8.3.2 Factors influencing cost

The cost is determined by several factors, one of which is the size of the plant. It is important to note that there is a negative correlation between the size of the plant and the cost. There is an inverse relationship between the size of a plant and its cost. As the size of the plant rises, the cost decreases, and vice versa.

(b) Production Level: There is a direct correlation between the level of production and cost. The cost increases in direct proportion to the amount of production, and conversely, decreases when the level of output decreases.

(c) The price of inputs and cost are directly related. As the cost of inputs increases, the overall cost also increases, and vice versa.

(d) Technological state: The more advanced and improved the technology, the lower the cost, and vice versa.

(e) Management and administrative efficiency: The level of efficiency in managing and administering tasks is inversely proportional to the cost incurred. The more the efficiency in management and administration, the better the product quality and the lower the cost. Costs will rise if there are inefficiencies in management and administration.

The theory of costs of a producing organization establishes a relationship between the total cost and the amount of production.

We may create a table that includes the cost levels at different levels of production. The name of this table is the cost schedule. Likewise, the expenses may be represented mathematically as the cost function. Ultimately, the connection between overall expenses and production may be represented by a graph known as the total cost curve.

The cost of production for a business is influenced by the following elements

- 1) Production's physical conditions: The ability of a business to produce output is contingent upon the specific inputs needed to achieve a given level of output. The information is derived from the production function, which was previously introduced

- 2) The cost of the resources used in the manufacturing process, known as factors of production, is determined by the characteristics of the production function.

However, a business may get the inputs at a certain price. For instance, labour may be obtained for a specified pay, money at a specific interest rate, and land at a specific rental cost. Likewise, an entrepreneur operates with the goal of generating financial gain. Next, we will cover the determination of salary, interest, rent, and profit. The multiplication of the physical units of an input by the price of that item yields the cost of that input. The summation of the values of all the inputs yields the total cost of manufacturing.

- 3) Optimal utilization of resources: Unit introduces the concept of finding the most cost-effective combination of inputs to achieve a desired level of output. The point where the isocost line is tangent to the isoquant represents the optimal combination of inputs that minimizes cost.
- 4) Furthermore, it is clarified that tangency also signifies the equivalence of the marginal rate of technological replacement with the input price ratio. Therefore, if a company's objective is to reduce expenses, we can determine the overall cost at various stages of production. It is believed that the company selects the mix of inputs that minimizes costs for each level of output. Put simply, the company selects a mix of inputs that falls on the growth route associated with a certain amount of output.

### **8.3.3 Financial expenses**

Economic cost is a fundamental concept used in the field of economic theory. It encompasses both explicit and implicit expenses. Explicit costs refer to the monetary payments and fees that entrepreneurs make to providers of different productive resources like as land, labour, capital, and raw materials. Explicit costs refer to the expenses incurred by a company, such as the rent for the building, pay for hired labourers,

interest on borrowed money, and the prices of raw goods, fuel, and electricity.

Implicit cost refers to the opportunity cost of using cash in one's own firm instead of investing it in another Endeavour, resulting in the foregone return on investment. Assume that a producer allocates Rs 10,000 from his own resources to begin a firm. If he had allocated this cash to another investment, he would have been able to generate an annual return of around Rs 1,000. Therefore, Rs 1,000 represents one element of hidden expenses.

(b) The remuneration or compensation the entrepreneur might have obtained if he had offered his services to other individuals or entities. If the entrepreneur chooses to work as a manager for another company instead of launching his own business, earning a monthly salary of Rs. 2,000, then this amount would be considered an additional component of hidden costs.

The hidden costs associated with creating a product or service refer to the potential earnings that may be obtained from the entrepreneur's money and labour in their most valuable alternative usage. Economic costs may be defined as the sum of explicit costs and implicit costs. The formula for economic costs is the sum of explicit costs and implicit costs.

When an economist mentions costs, they are specifically referring to the idea of economic expenses. Economic profits may be calculated by subtracting total economic expenses from total revenue, which is the product of price and quantity sold. Even if the overall revenue is equal to

The total economic expenses, the business still earns some profits, known as normal profits, which are equal to the implicit cost. However, the economic profits are zero.

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## 8.4 SHORT RUN COST

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The short run is a state when some elements cannot be adjusted, even if the amount of output varies, as described analytically. Inputs that are unable to be altered are referred to as fixed inputs or fixed factors. There are additional inputs or variables that are positively correlated with higher output and negatively correlated with lower production. Variable inputs or variable factors refer to the inputs or factors that may be altered in the short term. The concept of the short run should not be conflated with a specific period of time on the calendar. In the short term, there are some elements that remain constant while others might vary.

### 8.4.1 Costs may be categorized into two types: fixed costs and variable costs.

**Fixed costs** are expenses that remain constant regardless of the level of production or output. Fixed costs may be defined as the expenses associated with utilizing fixed components that do not vary in the short term. Total fixed costs refer to the whole expense incurred while using fixed elements in the short term. The fixed costs include expenses such as (i) remuneration for management and administrative personnel, (ii) building rental, and (iii) capital interest.

**Variable costs** are expenses that change proportionally with the level of production, rising as more is produced and declining as less is produced. Alternately variable costs refer to the expenses associated with exploiting variable components. Total variable costs refer to the aggregate expenses incurred by utilizing variable components. Variable costs are synonymous with direct costs or prime costs. Variable costs include expenses related to (i) the procurement of raw materials, (ii) the operation of equipment and machinery, including fuel and regular maintenance, and (iii) the employment of unskilled and semi-skilled workers. The overall cost of generating any level of output is equal to the sum of the total fixed cost and the total variable cost. Given that total



fixed cost stays constant by definition, any variation in total cost can only be attributed to changes in total variable cost.

The average cost, sometimes referred to as average total cost, is obtained by dividing the total cost by the total amount produced. The average fixed cost is obtained by dividing the total fixed cost by the number of units produced. The average variable cost is obtained by dividing the total variable cost by the number of units produced. The average total cost may be determined by summing the average fixed cost and the average variable cost.

The relationship between different costs may be stated as follows:

$$TC = TFC + TVC \quad (i)$$

The equation (i) states that total cost (TC) is equal to the sum of total fixed cost (TFC) and total variable cost (TVC).

TC represents the overall cost, TFC represents the total fixed cost, and TVC represents the total variable cost. Dividing the variable (i) by the amount generated (Q) yields the average costs.

$$\frac{TC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q} \quad (ii)$$

Or

$$ATC = AFC + AVC \quad (iii)$$

ATC refers to average total cost, AFC stands for average fixed cost, and AVC represents average variable cost.

#### 8.4.2 Marginal Cost

Marginal Cost is the additional cost incurred to create an additional unit of output. Illustration of this concept might be provided via an example.

Assume that the aggregate cost of manufacturing 10 units of a product is Rs. 1,000, whereas the aggregate cost of manufacturing 11 units of the same product is Rs. 1,100. The marginal cost of manufacturing the 11th unit of the product is Rs. 100, calculated by subtracting Rs. 1,000 from Rs. 1,100.



The marginal cost of producing  $(X + 1)$  units is equal to the total cost of producing  $X + 1$  units minus the total cost of producing  $X$  units.

Where  $X$  is the quantity of the commodity produced.

In the short run, the marginal cost of the  $(X + 1)$ th unit may be defined as the total variable cost (TVC) of  $X+1$  units less the TVC of  $X$  units, as only variable costs vary in the short run.

If the production of a commodity does not vary by exactly one unit, then the marginal cost (MC) is defined as

$\frac{\Delta TVC}{\Delta Q}$  where  $\Delta TVC$  represents change in total variable cost and  $\Delta Q$  Change in units of commodity produced.

Proof

$$\begin{aligned} MC_N &= \frac{\Delta TC}{\Delta Q} \\ &= \frac{\Delta TVC + \Delta TFC}{\Delta Q} \\ &= \frac{\Delta TVC}{\Delta Q} + \frac{\Delta TFC}{\Delta Q} \\ &= \frac{\Delta TVC}{\Delta Q} + \text{Zero} \end{aligned}$$

Described as  $\Delta TVC/\Delta Q$  where  $\Delta TVC$  denotes the adjustment in the overall variable cost and  $\Delta Q$  Alteration in the quantity of a commodity produced.

(Since TFC remains the same at all level of Output,  $\Delta TFC$  will always be zero)

$$= \frac{\Delta TVC}{\Delta Q}$$

i.e. MC is determined only by TVC

**Cost Schedule:** We will depict the different expenses, mentioned earlier, in connection to the amount of production using the following table that presents hypothetical data.

**Table 8.1 Tabular Representation of Cost Schedule**

| Q                                       | TFC                                    | TVC                                       | TC                            | AFC                                      | AVC                                         | ATC                                   | MC                               |
|-----------------------------------------|----------------------------------------|-------------------------------------------|-------------------------------|------------------------------------------|---------------------------------------------|---------------------------------------|----------------------------------|
| Quantity<br>Of output<br>(units)<br>(1) | Total<br>fixed<br>cost<br>(Rs.)<br>(2) | Total<br>variable<br>cost<br>(Rs.)<br>(3) | Total<br>cost<br>(Rs.)<br>(4) | Average<br>Fixed<br>Cost<br>(Rs.)<br>(5) | Average<br>Variable<br>Cost<br>(Rs.)<br>(6) | Average<br>total cost<br>(Rs.)<br>(7) | Marginal<br>Cost<br>(Rs.)<br>(8) |
| 0                                       | 400                                    | -                                         | 400.00                        | -                                        | -                                           | -                                     | -                                |
| 1                                       | 400                                    | 40.00                                     | 440.00                        | 400.00                                   | 40.00                                       | 440.00                                | 40.00                            |
| 2                                       | 400                                    | 64.00                                     | 464.00                        | 200.00                                   | 32.00                                       | 232.00                                | 24.00                            |
| 3                                       | 400                                    | 84.00                                     | 484.00                        | 133.33                                   | 28.00                                       | 161.33                                | 20.00                            |
| 4                                       | 400                                    | 104.00                                    | 504.00                        | 100.00                                   | 26.00                                       | 126.00                                | 20.00                            |
| 5                                       | 400                                    | 120.00                                    | 520.00                        | 80.00                                    | 24.00                                       | 104.00                                | 16.00                            |
| 6                                       | 400                                    | 144.00                                    | 544.00                        | 66.67                                    | 24.00                                       | 90.67                                 | 24.00                            |
| 7                                       | 400                                    | 182.00                                    | 582.00                        | 57.14                                    | 26.00                                       | 83.14                                 | 38.00                            |
| 8                                       | 400                                    | 224.00                                    | 624.00                        | 50.00                                    | 28.00                                       | 78.00                                 | 42.00                            |
| 9                                       | 400                                    | 288.00                                    | 688.00                        | 44.44                                    | 32.00                                       | 76.44                                 | 64.00                            |
| 10                                      | 400                                    | 360.00                                    | 760.00                        | 40.00                                    | 36.00                                       | 76.00                                 | 72.00                            |
| 11                                      | 400                                    | 436.00                                    | 836.00                        | 36.36                                    | 39.64                                       | 76.00                                 | 76.00                            |
| 12                                      | 400                                    | 521.60                                    | 921.60                        | 33.33                                    | 43.48                                       | 76.81                                 | 85.60                            |
| 13                                      | 400                                    | 640.00                                    | 1040.00                       | 30.76                                    | 49.24                                       | 80.00                                 | 118.40                           |
| 14                                      | 400                                    | 792.00                                    | 1192.00                       | 28.56                                    | 56.64                                       | 85.20                                 | 152.80                           |
| 15                                      | 400                                    | 998.00                                    | 1398.00                       | 26.68                                    | 66.52                                       | 93.20                                 | 205.20                           |
| 16                                      | 400                                    | 1296.00                                   | 1696.00                       | 25.00                                    | 81.00                                       | 106.00                                | 298.00                           |
| 17                                      | 400                                    | 1674.00                                   | 2074.00                       | 23.52                                    | 98.48                                       | 122.00                                | 378.00                           |
| 18                                      | 400                                    | 2156.00                                   | 2556.00                       | 22.24                                    | 119.76                                      | 142.00                                | 482.00                           |
| 19                                      | 400                                    | 2792.00                                   | 3192.00                       | 21.04                                    | 146.96                                      | 168.00                                | 636.00                           |
| 20                                      | 400                                    | 3600.00                                   | 4000.00                       | 20.00                                    | 180.00                                      | 200.00                                | 808.00                           |

**The explanations for the computations in Table 8.1 are provided below:**

The Total Fixed Costs (TFC) shown in Column 2 remain unchanged across different levels of output and are therefore assumed to be Rs. 400 throughout the entire period.

The TVC provided in Column 3 is increasing as the production increases.

3) The Total Cost (TC) listed in Column 4 is derived by summing the Total Fixed Cost (TFC) from Column 2 and the Total Variable Cost (TVC) from Column 3 for each corresponding output level. For example, when the output is 2 units, the TFC remains Rs. 400 and the TVC is Rs. 64. Therefore, the TC is obtained by adding Rs. 400 and Rs. 64, which results in a total cost of Rs. 464.

4) The Average Fixed Cost (AFC) in Column 5 is obtained by dividing the Total Fixed Cost (TFC) from Column 2 by the corresponding output level in Column 1. For example, at an output of 3 units, the AFC is calculated as  $\text{Rs. } 400 \div 3$ , which equals Rs. 133.33.

Similarly, the Average Variable Cost (AVC) in Column 6 is calculated by dividing the Total Variable Cost (TVC) from Column 3 by the output level in Column 1. For instance, when output is 4 units and the TVC is Rs. 104, the AVC becomes  $\text{Rs. } 104 \div 4 = \text{Rs. } 26$ .

The Average Total Cost (ATC), found in Column 7, is calculated by dividing the Total Cost (TC) from Column 4 by the output from Column 1. For example, if 5 units are produced and the TC is Rs. 520, then the ATC is  $\text{Rs. } 520 \div 5 = \text{Rs. } 104$ .

Alternatively, ATC can be obtained by summing the AFC and AVC for a given output level. So, for an output of 5 units, if the AFC is Rs. 80 and the AVC is Rs. 24, the ATC is  $\text{Rs. } 80 + \text{Rs. } 24 = \text{Rs. } 104$ .

Marginal Cost (MC), shown in Column 8, is calculated as the change in total cost when output increases by one unit. For instance, the TC for 4 units is Rs. 504 and for 5 units it is Rs. 520. The MC of the 5th unit is therefore  $\text{Rs. } 520 - \text{Rs. } 504 = \text{Rs. } 16$ .

Alternatively, MC can be derived using changes in TVC. If the TVC rises from Rs. 104 at 4 units to Rs. 120 at 5 units, the MC is  $\text{Rs. } 120 - \text{Rs. } 104 = \text{Rs. } 16$ .

### **Curves depicting total, fixed, and variable costs**

The data shown in Table 8.1 will be divided into two sections.

i.) Aggregate cost curves, and ii) Marginal cost curves

This section graphically represents the data from Columns 1, 2, 3, and 4 through three curves—Total Fixed Cost Curve (TFCC), Total Variable Cost Curve (TVCC), and Total Cost Curve (TCC)—depicted in Figure 8.1.

The X-axis of the graph represents the quantity of output produced, while the **Y-axis** denotes cost in rupees.

The Total Fixed Cost (TFC) remains constant at Rs. 400 across all output levels. As a result, the TFCC appears as a horizontal line parallel to the X-axis. Even when no output is produced (i.e., at zero output), the TFC is Rs. 400.

The Total Variable Cost (TVC) increases with each additional unit of production. This is plotted as the TVCC, where each point on the curve represents the TVC corresponding to a specific level of output. For example:

- At an output of 20 units, the TVC is Rs. 3,600—represented by Point A on the TVCC.
- At 16 units of output, the TVC is Rs. 1,296—marked as Point b on the TVCC.

The Total Cost Curve (TCC) is derived by summing the TFC and TVC at each level of output and plotting the resulting total cost (TC). For instance:

- When output is 20 units, the TFC is Rs. 400 and the TVC is Rs. 3,600, making the TC Rs. 4,000. This is represented by Point a' on the TCC.

- At 16 units, the TFC is still Rs. 400, while the TVC is Rs. 1,296.

Hence, the TC becomes Rs. 1,696, marked as Point b' on the TCC.

By connecting all such calculated points like a', b', and so on, we get the full Total Cost Curve (TCC). Notably, the TCC has the same number of data points (20) as the TVCC, reflecting consistent output levels across both curves.

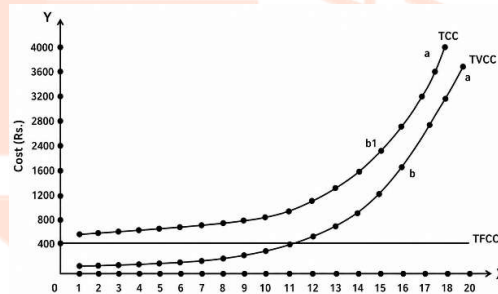


**Figure 8.1: Cost Structure Visualization – Total, Fixed, and Variable**

Figure 8.1: Graphical Representation of Total, Fixed, and Variable Cost Curves

#### 8.4.5 Average Total, Average Fixed, Average Variable Cost Curves and Marginal Cost Curve

The data from Columns 5, 6, 7, and 8 of Table 11.1 can be represented graphically through the average total cost curve (ATCC), average fixed cost curve (AFCC), average variable cost curve (AVCC), and the marginal cost curve (MCC). These cost curves are illustrated in Figure 8.2.

In Figure 8.1, the total fixed cost curve (TFCC) is shown as a straight horizontal line, indicating that the total fixed cost remains constant across all levels of output. The TVCC demonstrates that the aggregate variable cost first rises at a diminishing pace and then accelerates as production grows. The rate of rise may be determined by calculating the slope of the TVCC. An analysis of the factors influencing the behaviour

of AVCC will be conducted in Section 8.4.6. The vertical gap between TCC and TVC represents TFC at various degrees of production. The vertical distance between TCC and TVCC is constant because TFC remains unchanged in the near term, regardless of output level.

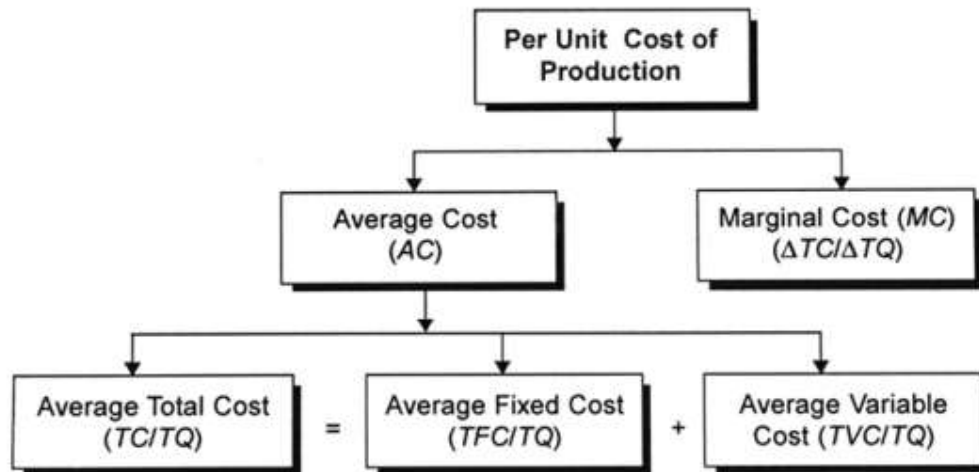


**Fig.8.2 Per Unit Cost of Production**

Figure illustrates the Average Fixed Cost (AFC) using the Average Fixed Cost Curve (AFCC). The graph shows that as the amount of output grows, AFC decreases continually. This is because the Total Fixed Cost (TFC) stays constant while AFC equals the Average Variable Cost (AVC). Initially, AFC decreases, hits a low at point 'a', and then increases. At the point 'a' when AVC is at its lowest, the marginal cost (MC) is equal to the average variable cost (AVC). The ATC first decreases, reaches a minimum at point c, and then increases. At the point c, when average total cost (ATC) is at its minimum, marginal cost (MC) is equal to ATC. Subsequently, the marginal cost first decreases, reaches its lowest value at 'b', and then increases. It has been observed that MC is equal to both AVC and ATC when they are at their minimum.

Figure 8.2 highlights an important observation: the MC curve is positioned below both the AVC curve and the ATC curve when they are decreasing, and above them when they are increasing.



- 2) As the average fixed cost (AFC) curve approaches the horizontal axis, the average variable cost (AVC) curve also approaches the average total cost (ATC) curve. The difference in height between the ATC curve and the AVC curve at a certain level of production indicates the average fixed cost (AFC). As the amount of output increases, the AFC decreases, causing the gap between the ATC curve and the AVC curve to decrease. Therefore, by examining the ATC curve and AVC curve, it is always possible to determine the form of the AFC curve.
- 3) The ATC curve may be constructed by connecting the points obtained by adding the AFC and AVC at various levels of output.
- 4) The ATC curve has a U-shape, indicating that when the quantity of production grows in the short term, the average cost initially decreases until it reaches a certain threshold (c), beyond which it starts to climb. The AVC curve and MC curve both have a propensity to decline as the amount of production increases, eventually reaching a point when they start to climb.

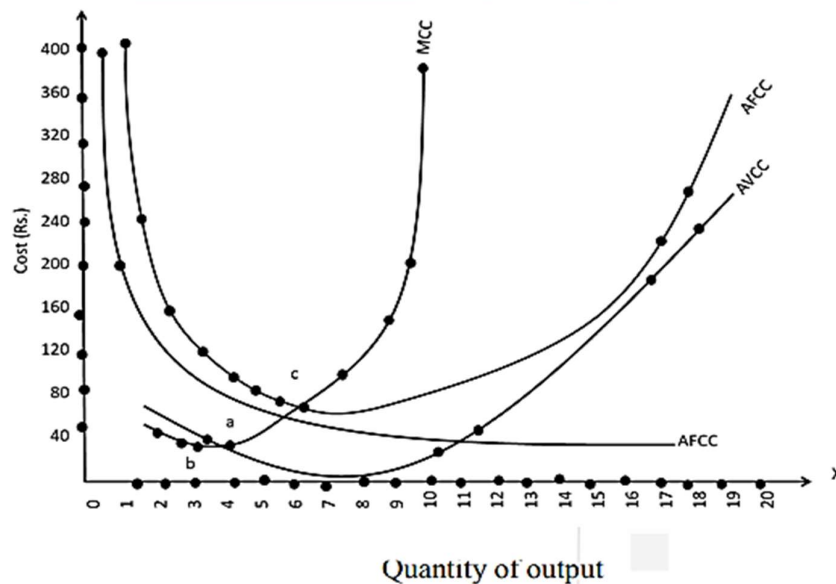


**Figure 8.2 displays a graphical representation of the average, total, fixed, and variable cost curves.**



The marginal cost curve (MCC) reaches its lowest point at a smaller output level than the average variable cost curve (AVCC).

For instance, marginal cost (MC) hits its minimum when the output is 5 units, while the average variable cost (AVC) reaches its lowest point at an output of 6 units. In contrast, the minimum point of average total cost (AC) occurs at 11 units of output.

**Shape of the Average Variable Cost Curve:** It is important to understand why the AVC initially declines and then begins to rise. This pattern can be explained by the law of variable proportions, which was discussed in Unit 9. The concept can be demonstrated clearly as follows.

$$AVC = \frac{TVC}{Q} \quad (i)$$

TVC represents the product of the quantity of the variable factor employed (V) and its price (P). Therefore, the relationship can be expressed as:

$$\begin{aligned} \text{Or} \quad AVC &= \frac{P(V)}{Q} \\ AVC &= P \left( \frac{V}{Q} \right) \quad (ii) \end{aligned}$$

The average product of a variable factor is calculated by dividing the total output produced (Q) by the quantity of the variable input utilized (V).

$$APV = \frac{Q}{V} \quad (iii)$$

The term "APV" refers to the average product of a variable component. As the utilisation of a variable component increases, the average product of that element also increases, as stated by the law of variable proportions and considering the price of the product  $\frac{P(1)}{APV}$  tends to fall.

Beyond a point, as APV

falls,  $p(1)/APV$

Therefore, the average variable cost The APV first declines, reaches a minimum, and then increases, forming a U-shaped curve.

### **Short-run Average Cost Curve and its U-Shape**

The short-run average cost (AC) curve typically takes a U-shape due to the combined effects of economies and diseconomies of scale. This shape arises because the average cost is made up of two components: the average fixed cost (AFC) and the average variable cost (AVC).

The AFC continuously falls as production increases, while the AVC initially declines, reaches a minimum point, and then begins to rise. When both AFC and AVC are decreasing, the average total cost (ATC) also declines, resulting in a downward-sloping portion of the ATC curve. Eventually, although AFC keeps falling, the rise in AVC becomes more significant. When this increase in AVC surpasses the reduction in AFC, ATC starts to rise, creating the U-shape.

Likewise, the marginal cost curve (MC) also exhibits a U-shaped pattern due to the law of variable proportions. According to this law, the marginal product of a variable input initially increases, reaches a peak, and then declines. Since  $MC = P_1 / MP_v$  (where  $MP_v$  is the marginal product of the variable factor), marginal cost falls when  $MP_v$  rises and rises when  $MP_v$  falls—thus forming a U-shaped MC curve.

### **Relationship Between Marginal Cost (MC) and Average Cost (AC)**

The relationship between MC and AC is systematic. When MC is below AC, it pulls AC downward. When MC is above AC, it pushes AC upward. Therefore, MC intersects AC at its minimum point. This interaction is crucial for understanding production efficiency and cost management.

Table 8.2 presents numerical data that illustrate how marginal cost, total cost, and average cost behave at different output levels, helping clarify this relationship in practice.

**Table 8.2: Cost Schedule**

| <b>Output<br/>(Units)</b> | <b>Total cost<br/>(Rs.)</b> | <b>Marginal cost<br/>(Rs.)</b> | <b>Average cost<br/>(Rs.)</b> |
|---------------------------|-----------------------------|--------------------------------|-------------------------------|
| (1)                       | (2)                         | (3)                            | (4)                           |
| 1                         | 60                          | 60                             | 60                            |
| 2                         | 110                         | 50                             | 55                            |
| 3                         | 162                         | 52                             | 54                            |
| 4                         | 216                         | 54                             | 54                            |
| 5                         | 275                         | 59                             | 55                            |

Column 2 displays the overall expense incurred in manufacturing various quantities of product.

Column 3 displays the incremental rise in overall expenses that occurs as a consequence of manufacturing an additional unit of output.

The term used to describe this concept is "marginal cost." The equation  $MC_n = TC_n - TC_{n-1}$  represents the relationship between the marginal cost (MC) and the total cost (TC) at two different levels of production (n and n-1).

$$AC_n = \frac{TC_n}{N}$$

Column 4 displays the mean cost at various production levels:

The information presented in this table indicates that:

The average cost decreases only when the marginal cost is lower than the average cost.

2. Until the third unit of production, the marginal cost is lower than the average cost and the average cost is decreasing. When the production of 2 units occurs, the marginal cost is Rs. 50, which is lower than the previous average cost of Rs. 60. As a result, the average cost decreases from Rs. 60 to Rs. 55. When the production of 3 units occurs, the marginal cost is Rs. 52, which is lower than the average cost of 2 units (Rs. 55). Consequently, the average cost decreases from Rs. 55 to Rs. 54.

The average cost remains constant when the marginal cost is equal to the average cost. When the production of 4 units is reached, the average

cost stays constant at Rs. 54. This is because the marginal cost, which is also Rs. 54, is equal to the average cost.

3) The average cost increases when the marginal cost exceeds the average cost.

When the production of 5 units occurs, the average cost increases from Rs. 54 to Rs. 55. This is due to the fact that the marginal cost, which is Rs. 59, is higher than the average cost of Rs. 54.

The link between marginal cost and average cost is a universal and applicable to any variable, such as revenue or product, in terms of their marginal and average values.

The box has a concise demonstration of the correlation. This is just for the purpose of providing information.

$$TC_n - TC_{n-1} < \frac{TC_n - TC_{n-1}}{n-1}$$

$$MC < AC$$

Since the left hand side is MC, and the right hand side is AC, it proves that  
 $MC < AC$

Therefore, a decrease in average cost indicates that the marginal cost is lower than the average cost. It may be shown in a similar manner that an increase in average cost implies that the marginal cost is higher than the average cost, while a constant average cost indicates that the marginal cost is equal to the average cost.

The link between marginal cost and average variable cost is analogous to the relationship between marginal cost and average cost due to the fact that marginal cost is unaffected by fixed cost.

### Check Your Progress

1. Distinguish between fixed cost and variable cost in the short run.

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2. What is Marginal Cost? How is it related to Total Cost?

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## 8.5 LONG RUN COST

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The long run is a time span when all elements or inputs are subject to change. The long run refers to a future time period, known as the planning horizon, during which an entrepreneur may strategically plan and anticipate changes in production to maximise their own benefits.

In the immediate term, the entrepreneur must see the existing plant as a fixed asset and can only increase production by using the facility for a longer duration each day.

Ultimately, he may strategize to establish supplementary producing capability without altering the duration for which the machine operates. The long run encompasses all potential short run scenarios from which the entrepreneur or other economic actors might make choices. The majority of the planning often occurs in the long term, whereas the execution occurs in the near term.

The concept of the least cost combination of inputs is previously discussed in unit 9. It is assumed that over time, each possible output may be created using the combination of inputs that has the lowest cost. By considering the element prices, we can determine the associated cost.

A long run total cost curve may be determined based on the amount of production connected with it. By using the long-run total cost curve, it

is possible to construct both the long-run average cost curve and the long-run marginal cost curve.

### 8.5.1 Long Run Average Cost Curve

Over time, all inputs in the production process can be adjusted to enhance productivity—no factor remains fixed in the long run. However, in the short run, certain factors such as the size of the plant and capital equipment remain fixed, meaning we cannot immediately alter them even if a change in output is desired. In contrast, the long run allows for adjustments to all inputs, including plant size, enabling firms to scale production up or down as needed.

The long run cost curve reflects the relationship between output and cost when all inputs are variable, highlighting the most cost-efficient combinations of inputs for different levels of production. The long run average cost (LRAC) is derived by dividing the total long run cost by the corresponding output level.

To better understand the derivation of the long run average cost curve, we will now explore two short run average cost curves illustrated in Figure 8.3.

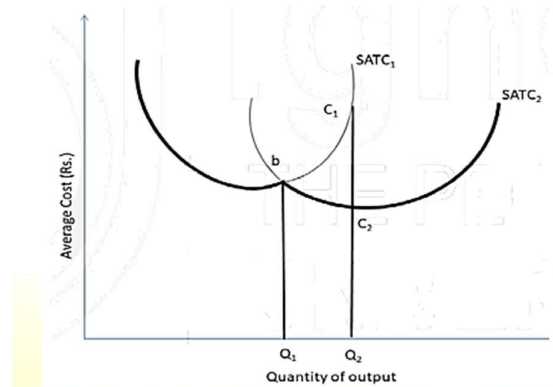


**Figure 8.3: Short Run Average Cost Curve**

Two short-run average total cost curves, labeled  $SATC_1$  and  $SATC_2$ , are depicted in the figure and are often referred to as plant curves. These

curves reflect the firm's cost structure given the size of the plant in the short run, during which the firm is constrained to operate along a particular SATC curve due to its fixed plant size. In this scenario, only two plant sizes are considered feasible.

By adjusting the quantity of variable inputs, the firm can change its level of output along the given SATC curve. For instance, to produce  $OQ_1$  units in the short run, the firm must incur an average cost of  $Q_1C_1$ , as shown by the  $SATC_1$  curve. However, in the long run, the firm can opt for a larger plant represented by  $SATC_2$  which enables it to produce the same  $OQ_1$  output at a lower average cost of  $Q_1C_2$ .

Thus, the firm will compare the average costs under different SATC curves to determine which plant size minimizes costs for a given level of output. Initially, for output levels up to  $OQ_0$ ,  $SATC_1$  offers lower average costs than  $SATC_2$ , making the smaller plant more efficient. Consequently, the firm will choose  $SATC_1$  for output up to  $OQ_0$ .

Although this example shows only two plants, it can easily be extended to include multiple plant sizes. The key conclusion is that, in the long run, the firm will select the plant size that results in the lowest possible average cost for any given output level.

In this two-plant scenario (illustrated in Figure 8.3), the long-run average cost (LRAC) curve is represented by the black line, which connects the lowest cost points of the short-run curves. If plant sizes could be adjusted in infinitely small increments resulting in a continuum of SATC curves then the LRAC curve would be smooth and continuous, as shown in Figure 8.4.



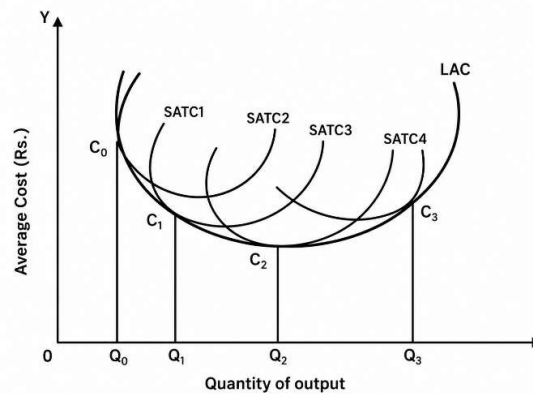


**Figure 8.4: Long Run Average Cost Curve**

In the short run, cost curves such as SATC1, SATC2, SATC3, and SATC4 represent average total costs for plants of varying capacities, while the long-run average cost (LAC) curve is depicted by a smooth, continuous line. When a firm decides on a specific level of output to produce in the long run, it selects the corresponding point on the LAC curve that offers the lowest possible cost. Based on this, the firm constructs an appropriate plant and operates along the associated short-run average cost (SATC) curve.

As shown in Figure 8.4, for an output level of  $OQ_0$ , the firm identifies point  $C_0$  on the LAC curve—where SATC1 touches the LAC. To produce  $OQ_0$  efficiently, the firm would adopt the plant corresponding to SATC1 and function at point  $C_0$  on that curve. Similarly, for producing  $OQ_1$ , the point of tangency is  $C_1$  where SATC2 meets the LAC. This logic applies to other points like  $C_2$  and  $C_3$ , which align with output levels  $OQ_2$  and  $OQ_3$ , respectively. Each of these tangency points reflects the least-cost combination of inputs for producing a specific level of output.

The long-run average cost curve is therefore described as an “envelope curve” because it envelopes the various short-run average cost curves. This curve effectively shows the minimum achievable cost for each

output level when the firm has the flexibility to adjust all inputs, including plant size.

It becomes evident that higher levels of output are most economically achieved with larger plants, while lower output levels are more cost-effectively handled by smaller facilities. The shape and nature of the LAC curve make it a powerful tool for visualizing and analyzing cost-efficiency across different production scales.

- Every point on the long-run average cost (LAC) curve represents a tangency with a specific short-run average cost (SAC) curve.
- The LAC curve touches the minimum points of various SAC curves, indicating the least-cost level of output achievable in the short run for each plant size.
- While the long-run average cost curve also follows a U-shape, its span is broader than that of the short-run average cost curves, reflecting more flexibility in input adjustment.
- When the LAC is declining, it intersects the SAC curve on the left side of the SAC's minimum point, typically along the downward-sloping segment.
- If the LAC is rising, it intersects the SAC curve to the right of the SAC's minimum, on its upward-sloping portion. In cases where the LAC is a horizontal straight line, it intersects the SAC at its lowest point, indicating constant returns to scale.

### **Long Run Marginal Cost Curve:**

The long-run average cost (LAC) curve depicts the lowest possible cost per unit for different output levels when all inputs are variable. In contrast, the long-run marginal cost (LRMC) curve shows the smallest increase in total cost when output rises by one unit, or the greatest decrease when output falls. The connection between short-run marginal cost and long-run marginal cost is visually presented in Figure 8.5.

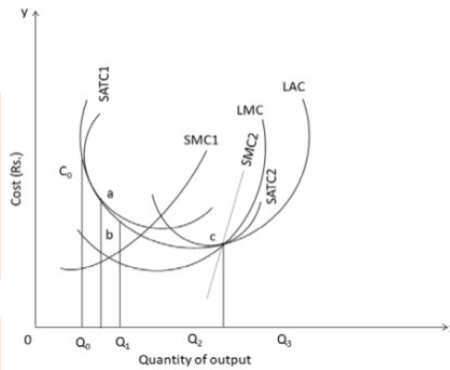


**Figure 8.5 Long Run Marginal Cost Curve**

At the output level  $OQ_0$ , the short-run average total cost ( $SATC_1$ ) equals the long-run average cost ( $LAC$ ). However, when output rises to  $OQ_1$ ,  $SATC_1$  becomes greater than  $LAC$ , indicating that short-run costs exceed long-run costs at that level. As production increases from  $OQ_1$  to  $OQ_2$ , the long-run marginal cost ( $LRMC$ ) becomes higher than the short-run marginal cost ( $SRMC$ ).

The long-run marginal cost curve intersects the  $LAC$  curve at its minimum point. Among all the short-run cost curves, only  $SATC_2$  aligns with the  $LAC$  at this lowest point, forming a tangent at point  $C$ . This point signifies the lowest cost level where both the short-run and long-run marginal costs are equal. The  $LRMC$  curve also exhibits a U-shape and crosses the  $LAC$  at its minimum, forming the  $LRMC$  curve by joining points  $B$  and  $C$ .

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## 8.6 SUMMARY

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This unit delves into the fundamental theories of cost in economics, focusing on how production costs evolve over time. It distinguishes between the short run—where some factors of production remain fixed and the long run, where all inputs are variable, allowing firms to fully adapt to changes in demand and scale of operation.

In the short run, businesses face a combination of fixed and variable costs, which influence decisions about output levels and pricing. The cost curves total cost ( $TC$ ), average cost ( $AC$ ), and marginal cost ( $MC$ )

provide insight into how costs behave as output changes, serving as essential tools for analyzing business efficiency and profitability.

Over the long run, firms can alter all inputs, leading to the possibility of economies and diseconomies of scale. This flexibility enables businesses to optimize production, minimize per-unit costs, and compete more effectively. The unit explores how the long-run average cost (LRAC) and long-run marginal cost (LRMC) curves are derived and how they guide decisions related to plant size and resource allocation. Furthermore, the unit connects cost behavior to market competition, helping learners understand how cost structures affect firm strategies in various competitive environments. By the end of this unit, students will gain a comprehensive understanding of cost concepts, enabling them to make informed decisions related to cost control, pricing, expansion, and long-term planning in real-world business scenarios.

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## 8.7 GLOSSARY

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- **Fixed Costs:** These are expenses that remain unchanged regardless of production levels, such as rent, salaries, and insurance, ensuring stability in business operations.
- **Variable Costs:** These are expenses that change in direct proportion to the level of production, such as costs for raw materials, wages for labor directly involved in production, and utility usage.
- **Total Cost (TC):** This refers to the complete cost incurred by a firm in producing goods or services, obtained by adding fixed and variable costs together.
- **Average Cost (AC):** This is the cost per unit of output, derived by dividing the total cost by the quantity produced. It includes both average fixed cost (AFC) and average variable cost (AVC).

- **Marginal Cost (MC):** This represents the cost added by producing one more unit of output. It is essential in determining the most efficient level of production for profit maximization.

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## 8.8 EXERCISES

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1. What are the differences between fixed and variable costs?

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2. How do you derive the short run cost curves, and what are their shapes?

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3. Explain the concept of economies and diseconomies of scale.

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4. How does the Long Run Average Cost (LRAC) curve relate to the Short Run Average Cost (SRAC) curves?

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5. Why is cost analysis important for business decision-making and strategic planning?

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## 8.9 SUGGESTED READINGS

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1. Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach. W.W. Norton & Company.
2. Pindyck, R. S., & Rubinfeld, D. L. (2018). Microeconomics. Pearson.
3. Perloff, J. M. (2017). Microeconomics: Theory and Applications with Calculus. Pearson.
4. Nicholson, W., & Snyder, C. (2017). Microeconomic Theory: Basic Principles and Extensions. Cengage Learning.
5. Stiglitz, J. E., & Walsh, C. E. (2006). Principles of Microeconomics. W.W. Norton & Company.
6. Mankiw, N. G. (2014). Principles of Microeconomics. Cengage Learning.
7. Samuelson, P. A., & Nordhaus, W. D. (2010). Economics. McGraw-Hill Education.
8. Gravelle, H., & Rees, R. (2004). Microeconomics. Pearson Education.
9. <https://egyankosh.ac.in/bitstream/123456789/79648/3/Unit-11.pdf>

# **BLOCK III: MARKET STRUCTURE AND EQUILIBRIUM OF THE FIRM IN PERFECT COMPETITION**

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## **UNIT 9: MARKET STRUCTURE, THEORY OF THE FIRM, CONCEPTS OF AVERAGE REVENUE (AR), MARGINAL REVENUE (MR), AND (TOTAL REVENUE) TR**

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### **STRUCTURE**

- 9.1 Introduction
- 9.2 Objectives
- 9.3 Concepts of Market
- 9.4 Market Structure
  - 9.4.1 Types of Market Structures
    - 9.4.1.1 Perfect Competition
    - 9.4.1.2 Monopoly
    - 9.4.1.3 Monopolistic Competition
    - 9.4.1.4 Oligopoly
- 9.5 Theory of the Firm
- 9.6 Detailed Examination of Revenue Concepts
- 9.7 Summary
- 9.8 Glossary
- 9.9 Exercises
- 9.10 Suggested Readings

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### **9.1 INTRODUCTION**

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In Unit 9, we delve into the essential elements of market structures and the theory of the firm, with a specific emphasis on average revenue (AR), marginal revenue (MR), and total revenue (TR). Market structure defines the environment in which firms operate, ranging from perfect competition, where numerous small firms compete with homogeneous products, to monopoly, where a single entity dominates the market. The



theory of the firm explores how firms make production and pricing decisions to maximize profit under varying market conditions. AR represents the revenue generated per unit of output sold, while MR denotes the additional revenue from selling one more unit. TR is the overall revenue earned from all units sold. These concepts are pivotal in understanding pricing strategies, profit maximization, and market behavior. By studying these concepts, we gain insights into how firms optimize their operations and adapt to competitive pressures in different market scenarios, influencing economic outcomes and welfare. This unit equips learners with foundational knowledge essential for analyzing firm behavior and market dynamics in economic contexts.

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## 9.2 OBJECTIVES

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By the end of this unit, you should be able to

1. Understand the various types of market structures and their characteristics.
2. Explore the theory of the firm and its applications in different market scenarios.
3. Grasp the concepts of average revenue, marginal revenue, and total revenue, and their roles in revenue analysis.
4. Analyze the interrelationships between average revenue, marginal revenue, and total revenue.
5. Illustrate these concepts through diagrams and real-world examples.
6. Critically examine the implications of market structures and firm behavior on economic outcomes.

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## 9.3 CONCEPTS OF MARKET

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**Definition:** A market is a platform or mechanism through which buyers and sellers interact to exchange goods and services for money. The concept encompasses various forms of markets, including physical locations like retail stores and virtual platforms like online marketplaces.

### **Key Elements:**

**Buyers and Sellers:** The participants in the market who engage in transactions. Buyers seek to purchase goods or services, while sellers aim to provide them.

**Goods and Services:** The products exchanged in the market. These can range from physical items, like food and clothing, to intangible services, like consultancy and digital content.

**Price Mechanism:** The system through which prices are determined based on supply and demand. Prices adjust to balance the quantity supplied by sellers and the quantity demanded by buyers.

**Transactions:** The exchanges that occur in the market, where buyers pay money to acquire goods or services from sellers.

Markets can be classified into various types based on different criteria. Here are the main types of markets:

1. **Perfect Competition:** In perfect competition, there are many buyers and sellers of a standardized product. Firms are price takers, meaning they cannot influence the market price. Examples include agricultural markets for commodities like wheat or corn.
2. **Monopoly:** A monopoly exists when there is only one seller of a product with no close substitutes. The monopolist has significant market power and can set prices. Examples include local utility companies or patented pharmaceuticals.
3. **Monopolistic Competition:** In this market structure, there are many firms selling differentiated products. Each firm has a degree of market power due to product differentiation. Examples include restaurants, clothing brands, and personal care products.
4. **Oligopoly:** An oligopoly consists of a few large firms dominating the market. These firms may collude to set prices (collusive oligopoly) or compete aggressively (non-collusive oligopoly). Examples include the automotive industry and the airline industry.

5. **Duopoly:** A special case of oligopoly where there are only two dominant firms in the market. Examples include major cola brands or operating systems in the computer industry.
6. **Perfectly Contestable Markets:** These markets are theoretical constructs where barriers to entry and exit are low, allowing for efficient competition regardless of the number of firms. Examples are rare in reality due to practical barriers.
7. **Factor Markets:** Factor markets involve the buying and selling of factors of production such as labor, capital, land, and entrepreneurship. These markets determine the prices of these factors, influencing production decisions in goods and services markets.

Understanding these types of markets helps economists, policymakers, and businesses analyze market behavior, competition levels, pricing strategies, and efficiency in resource allocation. Each type of market structure has its own characteristics, influencing how firms operate and how markets function in allocating resources and distributing goods and services.

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## 9.4 MARKET STRUCTURE

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Market structure refers to the organization and characteristics of a market, particularly the nature and degree of competition among firms. It encompasses various elements such as the number of firms in the market, the type of products offered, the level of competition, entry and exit barriers, and the market power of firms. Understanding market structure helps in analyzing the behavior of firms and predicting outcomes in terms of pricing, output, and efficiency.

### 9.4.1 Types of Market Structures

**9.4.1.1 Perfect Competition:** Perfect competition refers to a theoretical market scenario with specific defining features:

- **Large Number of Small Firms:** The market consists of many small producers, each too small to affect the market price on its own.
- **Identical Products:** All firms offer the same product, which means consumers view them as perfect substitutes.
- **Free Market Entry and Exit:** There are no significant obstacles preventing firms from joining or leaving the industry.
- **Complete Market Information:** Buyers and sellers are fully informed about product details and prevailing prices.
- **Price-Taking Firms:** Individual firms cannot influence the market price and must accept it as determined by overall market demand and supply.

In such a market, prices are established purely through the interaction of aggregate demand and supply forces. Firms aim to maximize their profits by producing the quantity of output where marginal cost (MC) equals marginal revenue (MR), which, in this case, equals the market price.

#### 9.4.1.2 Monopoly

A monopoly is a market structure with a single firm that controls the entire market:

**Single Firm:** Only one firm supplies the entire market.

**No Close Substitutes:** There are no close substitutes for the product offered by the monopolist.

**High Barriers to Entry:** Significant barriers prevent other firms from entering the market.

**Price Maker:** The monopolist has substantial control over the price.

In a monopoly, the firm maximizes its profit by producing the quantity where marginal revenue (MR) equals marginal cost (MC). The monopolist can set a higher price than in competitive markets, leading to higher profits but also potential inefficiencies and a loss of consumer surplus.

#### 9.4.1.3 Monopolistic Competitions

Monopolistic competition shares some characteristics with perfect competition but also has distinct features:

**Many Firms:** There are many firms, but each has a small degree of market power.

**Differentiated Products:** Firms sell products that are similar but not identical, allowing for product differentiation.

**Free Entry and Exit:** There are no significant barriers to entry or exit.

**Imperfect Information:** Buyers and sellers may not have perfect information.

In monopolistic competition, firms have some control over pricing due to product differentiation. They compete on factors such as quality, branding, and advertising. The demand curve facing each firm is downward-sloping, indicating that firms can influence the price to some extent. However, in the long run, economic profits tend to zero as new firms enter the market.

#### 9.4.1.4 Oligopoly

An oligopoly is a market structure characterized by a small number of large firms that dominate the market:

**Few Large Firms:** A few firms control the majority of the market share.

**Interdependence:** Firms are interdependent, meaning the actions of one firm affect the others.

**Barriers to Entry:** Significant barriers to entry prevent new firms from entering the market easily.

**Non-Price Competition:** Firms often compete on factors other than price, such as advertising and product differentiation.

Oligopolistic markets can exhibit a range of behaviors, from fierce competition to collusion. The strategic interactions between firms are often analyzed using game theory. One common model in oligopoly is the Cournot model, where firms choose quantities to produce, assuming their rivals' quantities are fixed.

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## 9.5 THEORY OF THE FIRM

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The theory of the firm encompasses various economic theories that explain the nature, behavior, and objectives of firms. Firms are central to the functioning of an economy as they produce goods and services, employ labor, and drive innovation. The theory of the firm aims to understand how firms make decisions about production, pricing, investment, and other strategic aspects to maximize their objectives, typically profit maximization.

### 1. Objectives of the Firm

While profit maximization is traditionally viewed as the primary objective of firms, other objectives may also be relevant, including:

- **Revenue Maximization:** Firms might aim to maximize their total revenue, particularly in markets where revenue growth is crucial for market share and competitive positioning.
- **Growth Maximization:** Some firms prioritize growth in size, market share, or sales over short-term profits.
- **Managerial Objectives:** Managers may have personal objectives, such as job security, power, or prestige, which can influence firm behavior.
- **Social and Environmental Objectives:** Firms might aim to achieve social or environmental goals, such as corporate social responsibility (CSR) initiatives or sustainable practices.

### 2. Profit Maximization

Profit maximization is the process by which firms determine the level of output and pricing that leads to the highest possible profit. This involves analyzing costs and revenues to identify the optimal production level.

#### 2.1 Total Revenue and Total Cost Approach

In this approach, firms compare total revenue (TR) and total cost (TC) to determine profit ( $\pi$ ):

$$\pi = TR - TC$$



Firms aim to maximize the difference between TR and TC. The profit-maximizing output is where the gap between TR and TC is the largest.

## **2.2 Marginal Revenue and Marginal Cost Approach**

The marginal analysis approach involves comparing marginal revenue (MR) and marginal cost (MC). The profit-maximizing condition is where MR equals MC:

$$MR = MC$$

At this point, any additional unit of output would add more to costs than to revenue, and producing less would forgo potential profit. This condition ensures that the firm is maximizing its profit.

### **Cost Structures**

Understanding cost structures is crucial for analyzing firm behavior and decision-making. Costs can be categorized into fixed costs (FC) and variable costs (VC).

#### **Fixed Costs**

Fixed costs are costs that do not change with the level of output. Examples include rent, salaries of permanent staff, and depreciation of capital equipment. Fixed costs are incurred even when the firm is not producing any output.

#### **Variable Costs**

Variable costs change with the level of output. Examples include raw materials, labor costs directly associated with production, and utility costs. Variable costs increase as production increases and decrease as production decreases.

#### **Total Cost**

Total cost (TC) is the sum of fixed and variable costs:

$$TC = FC + VC$$

#### **Average Cost**

Average cost (AC) is the cost per unit of output, calculated by dividing total cost by the quantity of output produced:

$$AC = \frac{TC}{Q}$$



### **Marginal Cost**

Marginal cost (MC) is the additional cost incurred from producing one more unit of output:

$$MC = \frac{dTC}{dQ}$$

MC plays a critical role in decision-making, as it helps firms determine the optimal level of production.

### **Production Functions**

Production functions describe the relationship between inputs and outputs in the production process. They illustrate how different combinations of inputs, such as labor and capital, result in varying levels of output.

#### **Cobb-Douglas Production Function**

A commonly used production function is the Cobb-Douglas production function:

$$Q = A L^{\alpha} K^{\beta}$$

where Q is output, L is labor, K is capital, A is total factor productivity, and  $\alpha$  and  $\beta$  are the output elasticities of labor and capital, respectively.

### **Short-Run and Long-Run Production**

**Short-Run:** In the short run, at least one factor of production is fixed. Firms decide how much to produce based on existing capacity. They aim to maximize profit by adjusting the variable factors.

**Long-Run:** In the long run, all factors of production can be varied. Firms make decisions about expanding or reducing capacity, investing in new technology, and other strategic choices.

### **Market Structures and Firm Behavior**

The behavior and decision-making of firms are influenced by the market structure in which they operate. Different market structures present different challenges and opportunities for firms.

### **Perfect Competition**

In a perfectly competitive market, firms are price takers and can sell as much as they want at the market price. The demand curve facing each firm is perfectly elastic, and the profit-maximizing condition is  $P = MC$ .

### **Monopolistic Competition**

In monopolistic competition, firms have some control over pricing due to product differentiation. The demand curve facing each firm is downward-sloping. Firms maximize profit by producing the quantity where  $MR = MC$ .

### **Oligopoly**

In an oligopoly, a few large firms dominate the market. Firms are interdependent, meaning the actions of one firm affect the others. Strategic interactions between firms are often analyzed using game theory. Common models include the Cournot model, where firms choose quantities, and the Bertrand model, where firms choose prices.

### **Monopoly**

In a monopoly, a single firm controls the entire market. The monopolist maximizes profit by producing the quantity where  $MR = MC$ . The monopolist can set a higher price than in competitive markets, leading to higher profits but also potential inefficiencies and a loss of consumer surplus.

### **Alternative Theories of the Firm**

Beyond the traditional profit-maximization model, several alternative theories of the firm have been proposed to explain firm behavior.

### **Managerial Theories**

Managerial theories suggest that firms are not solely focused on profit maximization but also on managerial objectives, such as utility maximization for managers, which may include salary, job security, and power.

- **Baumol's Sales Revenue Maximization Model:** This model posits that managers aim to maximize sales revenue subject to a

minimum profit constraint. The focus on sales revenue can be due to its correlation with managerial compensation, market share, and firm growth.

- **Williamson's Managerial Discretion Model:** This model suggests that managers have discretion over firm resources and may use them to maximize their utility, which includes salary, job security, and perks, rather than solely focusing on profit maximization.

### **Behavioral Theories**

Behavioral theories of the firm focus on the internal decision-making processes and organizational behavior. They recognize that firms are complex organizations with multiple goals and stakeholders.

- **Cyert and March's Behavioral Theory:** This theory suggests that firms operate under bounded rationality, where decision-makers have limited information and cognitive limitations. Firms satisfy rather than optimize, aiming for satisfactory outcomes rather than maximizing objectives. Decision-making is influenced by internal negotiation and coalition-building among different stakeholders.

### **Transaction Cost Economics**

Transaction cost economics, developed by Ronald Coase and Oliver Williamson, focuses on the costs of transactions between firms and within firms. The theory suggests that firms exist to minimize transaction costs, which include the costs of negotiating, monitoring, and enforcing contracts.

- **Coase's Theory of the Firm:** Coase argued that firms emerge to reduce transaction costs associated with market exchanges. Within firms, hierarchical organization can reduce the costs of coordinating and monitoring transactions compared to market transactions.
- **Williamson's Transaction Cost Economics:** Williamson expanded on Coase's ideas, emphasizing the role of asset

specificity, uncertainty, and frequency in determining transaction costs. Firms choose between market transactions and internal organization based on the comparative costs of each.

### **Resource-Based View**

The resource-based view (RBV) focuses on the internal resources and capabilities of the firm as the primary determinants of competitive advantage and firm behavior.

- **Barney's RBV:** This theory suggests that firms achieve sustained competitive advantage by possessing valuable, rare, inimitable, and non-substitutable (VRIN) resources. The focus is on the unique resources and capabilities that differentiate firms from their competitors and drive their strategic decisions.

### **Strategic Decision-Making**

Strategic decision-making involves long-term planning and positioning to achieve competitive advantage and ensure the firm's survival and growth.

### **Market Entry and Exit**

Firms make strategic decisions about entering new markets or exiting existing ones based on potential profitability, competitive dynamics, and barriers to entry or exit. Market entry can involve significant investments and risks, while exit decisions might be driven by unprofitability or strategic realignment.

### **Investment in Innovation**

Investment in innovation is crucial for maintaining competitive advantage and adapting to changing market conditions. Firms invest in research and development (R&D), technology, and product development to innovate and differentiate their offerings.

### **Mergers and Acquisitions**

Mergers and acquisitions (M&A) are strategic decisions aimed at achieving growth, market expansion, or synergies. M&A can provide firms with access to new markets, technologies, and resources, but they also involve significant risks and integration challenges.

### **Diversification**

Diversification involves expanding into new markets or product lines to reduce risk and achieve growth. Firms may pursue related diversification, where they expand into areas related to their core business, or unrelated diversification, where they enter entirely different industries.

### **Check Your Progress**

1. What are the main characteristics of different market structures?

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2. Define Total Revenue, Average Revenue, and Marginal Revenue.

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## **9.6 EXAMINATION OF REVENUE CONCEPTS**

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Revenue concepts are fundamental to the economic analysis of firms. These include Total Revenue (TR), Average Revenue (AR), and Marginal Revenue (MR). Understanding these concepts is crucial for firms to make informed decisions about production, pricing, and profitability.

### **9.6.1 Total Revenue (TR)**

**Definition:** Total Revenue (TR) is the total amount of money a firm receives from selling its goods or services. It is calculated as the product of the price (P) and the quantity sold (Q).

$$TR = P \times Q$$

**Importance:**

- **Measure of Sales Performance:** TR provides a measure of the firm's overall sales performance and is a key indicator of market success.
- **Basis for Profit Calculation:** TR is a fundamental component in calculating profit, which is the difference between total revenue and total cost (TC).
- **Indicator of Market Demand:** Changes in TR can reflect shifts in market demand and consumer preferences.

**Example:**

If a firm sells 100 units of a product at \$10 each, the total revenue would be:

$$TR = 100 \times 10 = \$1000$$

### 9.6.2 Average Revenue (AR)

**Definition:**

Average Revenue (AR) is the revenue earned per unit of output sold. It is calculated by dividing total revenue by the quantity sold.

$$AR = \frac{TR}{Q}$$

In most market structures, AR is equal to the price of the product.

**Importance:**

- **Price Indicator:** AR indicates the price at which goods or services are sold, providing insights into pricing strategies.
- **Revenue Analysis:** AR helps in understanding how revenue changes with variations in quantity sold.

**Example:**

Continuing from the previous example, if a firm's total revenue is \$1000 from selling 100 units, the average revenue would be:

$$AR = \frac{1000}{100} = \$10$$

### 9.6.3 Marginal Revenue (MR)

**Definition:** Marginal Revenue (MR) is the additional revenue generated from selling one more unit of output. It is calculated as the change in total revenue resulting from a change in the quantity sold.

$$MR = \frac{dTR}{dQ}$$

**Importance:**

- **Decision-Making:** MR is crucial for decision-making regarding production levels. Firms aim to produce up to the point where MR equals marginal cost (MC) to maximize profit.
- **Price and Output Determination:** Understanding MR helps firms in determining optimal pricing and output levels.

**Example:** If a firm's total revenue increases from \$1000 to \$1050 when it sells one additional unit (from 100 to 101 units), the marginal revenue would be:

$$MR = \frac{1050 - 1000}{101 - 100} = \$50$$

### Revenue Concepts in Different Market Structures

The behavior of TR, AR, and MR varies across different market structures, influencing firm decisions and market outcomes.

### 9.6.4 Perfect Competition

In a perfectly competitive market, individual firms act as price takers, meaning they can sell any quantity of output at the prevailing market price without influencing it. Under such conditions, the following relationships exist:

- **Total Revenue (TR):** Increases proportionally with output since the price is fixed, leading to a linear TR curve.
- **Average Revenue (AR):** Equals the market price because total revenue divided by quantity yields a constant value.



- **Marginal Revenue (MR):** Also equals the market price, as each additional unit sold adds the same amount to total revenue.

Because of the price-taking nature of firms, the demand curve they face is perfectly elastic, and it holds true that **AR = MR = Price**. The profit-maximizing output is determined where **Marginal Cost (MC)** equals **Marginal Revenue (MR)**.

**Example:** If the market price is \$10 and a firm sells 50 units:

- $TR = 10 \times 50 = \$500$
- $AR = 500/50 = \$10$
- $MR = 10$  (constant and equal to the price)

### 9.7.5 Monopolistic Competition

In monopolistic competition, firms have some control over pricing due to product differentiation. The demand curve facing each firm is downward-sloping, and the following relationships apply:

- **TR:** Total revenue increases with quantity sold but at a decreasing rate due to the downward-sloping demand curve.
- **AR:** Average revenue decreases as quantity sold increases, reflecting the price reduction required to sell more units.
- **MR:** Marginal revenue is less than AR and also decreases with quantity sold.

Firms maximize profit by producing the quantity where  $MR = MC$ .

**Example:** If a firm sells 20 units at \$15 each, and to sell 21 units, it must lower the price to \$14:

- $TR_{20} = 20 \times 15 = \$300$
- $TR_{21} = 21 \times 14 = \$294$
- $AR_{20} = \frac{300}{20} = \$15$
- $AR_{21} = \frac{294}{21} = \$14$
- $MR_{21} = 294 - 300 = -\$6$

### 9.6.6 Oligopoly

In an oligopoly, a few large firms dominate the market. Firms are interdependent, and the behavior of one firm affects the others. Strategic interactions are often analyzed using game theory. Common models include the Cournot model (quantity competition) and the Bertrand model (price competition).

- **TR:** Total revenue varies based on the chosen strategic variable (price or quantity) and the competitive behavior of other firms.
- **AR:** Average revenue depends on the pricing strategy and competitive dynamics.
- **MR:** Marginal revenue can be influenced by the strategic responses of rival firms.

**Example:** In a Cournot duopoly, if Firm A and Firm B choose quantities  $Q_A$  and  $Q_B$  respectively, the market price  $P$  depends on the total quantity  $Q_A + Q_B$ . The TR, AR, and MR for Firm A would depend on its quantity and the quantity chosen by Firm B.

### 9.7.7 Monopoly

In a monopoly, a single firm controls the entire market. The monopolist maximizes profit by producing the quantity where  $MR = MC$ . The monopolist can set a higher price than in competitive markets, leading to higher profits but also potential inefficiencies and a loss of consumer surplus.

- **TR:** Total revenue increases with quantity sold but at a decreasing rate due to the downward-sloping demand curve.
- **AR:** Average revenue decreases as quantity sold increases, reflecting the price reduction required to sell more units.
- **MR:** Marginal revenue is less than AR and also decreases with quantity sold.

**Example:** If a monopolist sells 10 units at \$20 each, and to sell 11 units, it must lower the price to \$18:

$$TR_{10} = 10 \times 20 = \$200$$

$$TR_{11} = 11 \times 18 = \$198$$

$$TR_{10} = \frac{200}{10} = \$20$$

$$AR_{11} = \frac{198}{11} = \$18$$

$$MR_{11} = 198 - 200 = -\$2$$

- $TR_{11} = 11 \times 18 = \$198$
- $AR_{10} = \frac{200}{10} = \$20$
- $AR_{11} = \frac{198}{11} = \$18$
- $MR_{11} = 198 - 200 = -\$2$

### 9.6.8 Practical Applications of Revenue Concepts

Understanding revenue concepts helps firms in various practical applications, including pricing strategies, output decisions, and market analysis.

#### Pricing Strategies

- **Cost-Plus Pricing:** Firms add a markup to the average cost to determine the price. Understanding AR and AC helps in setting a price that covers costs and generates profit.
- **Penetration Pricing:** Firms set a low initial price to gain market share and increase TR. Once a significant market share is achieved, they may adjust prices to maximize profit.
- **Price Discrimination:** This occurs when firms set varying prices for the same product or service across different customer groups, based on their willingness or ability to pay. Knowledge of demand elasticity is essential, as it allows firms to identify which customers are more or less sensitive to price changes and adjust pricing strategies accordingly for maximum revenue.

#### Output Decisions

- **Profit Maximization:** Firms use MR and MC to determine the optimal level of output where  $MR = MC$ .

- **Break-Even Analysis:** Firms analyze the level of output at which TR equals TC, ensuring that all costs are covered, and no loss is incurred.

### **Market Analysis**

- **Demand Estimation:** Firms use revenue concepts to estimate market demand and forecast sales.
- **Competitive Analysis:** Firms analyze the revenue behavior of competitors to inform strategic decisions and anticipate market changes.

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## **9.7 SUMMARY**

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Unit 9 has provided a comprehensive exploration of market structures and the theory of the firm, focusing on average revenue (AR), marginal revenue (MR), and total revenue (TR). We have examined how market structures vary from perfect competition to monopoly, impacting firms' pricing and production decisions. The theory of the firm has elucidated how firms maximize profit by adjusting output levels based on revenue analysis. AR, MR, and TR have been dissected to understand their roles in determining pricing strategies and profit optimization. This unit has underscored the interplay between market structure and firm behavior, illustrating how competitive dynamics influence revenue generation and market outcomes. Learners have gained insights into the complexities of market interactions, equipping them with analytical tools to assess economic efficiency and welfare implications across different market scenarios.

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## **9.8 GLOSSARY**

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- **Market Structure:** The competitive environment in which firms operate.
- **Theory of the Firm:** Analysis of how firms maximize profit under different market conditions.
- **Average Revenue (AR):** Revenue earned per unit of output sold.

- **Marginal Revenue (MR):** Additional revenue earned from selling one more unit of output.
- **Total Revenue (TR):** Overall revenue earned from all units of output sold.

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## 9.9 EXERCISES

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1. Explain how average revenue (AR) differs between perfect competition and monopoly.

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2. Why is marginal revenue (MR) important for profit maximization? Provide an example.

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3. Discuss the market structures where firms have some degree of control over price.

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4. How does the theory of the firm help in understanding pricing decisions?

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5. Illustrate the relationship between AR, MR, and TR using diagrams for a monopoly market.

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## 9.10 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics (9th ed.). Pearson.
2. Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach (9th ed.). W.W. Norton & Company.
3. Carlton, D. W., & Perloff, J. M. (2005). Modern Industrial Organization (4th ed.). Pearson.
4. Samuelson, P. A., & Nordhaus, W. D. (2010). Economics (19th ed.). McGraw-Hill Education.
5. Kreps, D. M. (1990). A Course in Microeconomic Theory. Princeton University Press.
6. Tirole, J. (1988). The Theory of Industrial Organization. MIT Press.
7. Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99-120.
8. Baumol, W. J. (1959). Business Behavior, Value and Growth. Macmillan.

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## **UNIT 10: EQUILIBRIUM OF THE FIRM - TR-TC AND EQUILIBRIUM OF THE FIRM: MR-MC APPROACH**

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### **STRUCTURE**

- 10.1 Introduction
- 10.2 Objectives
- 10.3 Key Concepts
  - 10.3.1 Total Revenue - Total Cost (TR-TC) Approach
  - 10.3.2 Marginal Revenue - Marginal Cost (MR-MC) Approach
- 10.4 Equilibrium of the Firm: TR-TC Approach
- 10.5 Equilibrium of the Firm: MR-MC Approach
- 10.6 Summary
- 10.7 Glossary
- 10.8 Exercises
- 10.9 Suggested Readings

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### **10.1 INTRODUCTION**

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This unit explores the essential concepts of firm equilibrium through two key approaches: the Total Revenue–Total Cost (TR-TC) method and the Marginal Revenue–Marginal Cost (MR-MC) method. These frameworks help explain how firms identify the most profitable output level. The TR-TC approach compares total revenue and total cost to find the output that yields the highest profit. In contrast, the MR-MC method examines the additional revenue and cost from producing one more unit,



determining equilibrium where marginal revenue equals marginal cost. These analytical tools are applicable across different market structures, including perfect competition and monopoly, offering insights into strategic production decisions. By understanding these approaches, students gain the skills to analyze profit maximization, manage costs, and make informed economic choices in real-world situations. These methods also highlight how changes in costs or market demand affect firm behavior. A clear grasp of equilibrium concepts enables firms to adapt efficiently in dynamic and competitive environments.

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## 10.2 OBJECTIVES

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By the end of this unit, you will be able to:

1. Grasp the fundamental ideas of total revenue and total cost.
2. Describe how a firm's equilibrium is determined using the total revenue–total cost (TR-TC) method.
3. Comprehend the meanings of marginal revenue and marginal cost.
4. Illustrate how the marginal revenue–marginal cost (MR-MC) method is used to identify firm equilibrium.
5. Differentiate between the TR-TC and MR-MC approaches, highlighting their similarities and differences.
6. Demonstrate the practical application of these concepts in real-world business situations.

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## 10.3 KEY CONCEPTS

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### 10.3.1 Total Revenue - Total Cost (TR-TC) Approach

**Total Revenue (TR):** Total revenue refers to the overall earnings a firm obtains from the sale of its products or services. It is determined by multiplying the price of each unit by the total quantity sold. In mathematical terms, it can be represented as:

$$TR = P \times Q$$

Where P denotes the price per unit and Q represents the quantity of goods sold. The Total Revenue (TR) curve generally slopes upward from the origin, reflecting that as the quantity of output sold increases, total revenue also rises—assuming the price remains constant or does not fall significantly. This upward slope illustrates the direct relationship between quantity sold and the firm's revenue in most typical market scenarios.

**Total Cost (TC):** Total cost represents the total expenditure incurred by a firm in producing a given level of output. It includes both fixed costs (costs that do not change with the level of output, such as rent and salaries) and variable costs (costs that vary with the level of output, such as raw materials and labor). Mathematically, it is expressed as:

$$TC = TFC + TVC$$

Where TFC is total fixed costs and TVC is total variable costs. The TC curve typically slopes upwards, reflecting increasing costs as output increases.

**Profit Maximization:** In the TR-TC approach, a firm maximizes profit by producing the output level where the difference between total revenue and total cost is the greatest. This difference represents the firm's profit:

$$\text{Profit} = TR - TC$$

Graphically, profit maximization occurs where the vertical distance between the TR and TC curves is the largest. This approach provides a straightforward way to visualize and calculate the profit-maximizing output.

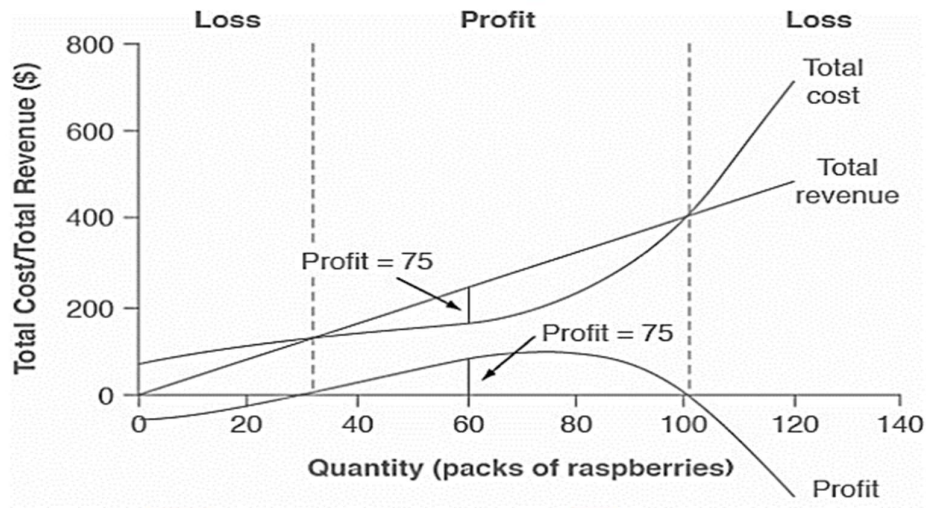


**Fig. 10.1 Profit = TR – TC**

### 10.3.2 Marginal Revenue - Marginal Cost (MR-MC) Approach

**Marginal Revenue (MR):** Marginal revenue is the additional revenue generated from selling one more unit of output. It is the change in total revenue resulting from a one-unit increase in quantity sold:

$$MR = \Delta TR / \Delta Q$$

where  $\Delta TR$  is the change in total revenue and  $\Delta Q$  is the change in quantity sold. In a perfectly competitive market, MR equals the market price (P) because each additional unit sold at the same price adds directly to total revenue.

**Marginal Cost (MC):** Marginal cost is the additional cost incurred from producing one more unit of output. It is the change in total cost resulting from a one-unit increase in production:

$$MC = \frac{\Delta TC}{\Delta Q}$$

Where  $\Delta TC$  is the change in total cost and  $\Delta Q$  is the change in quantity produced. The MC curve typically has a U-shape due to initially decreasing marginal costs followed by increasing marginal costs as production expands.

**Profit Maximization:** In the MR-MC approach, a firm maximizes profit by producing the output level where marginal revenue equals marginal cost ( $MR = MC$ ). At this point, the cost of producing an additional unit equals the revenue it generates, ensuring that profit is maximized:

$$MR = MC$$

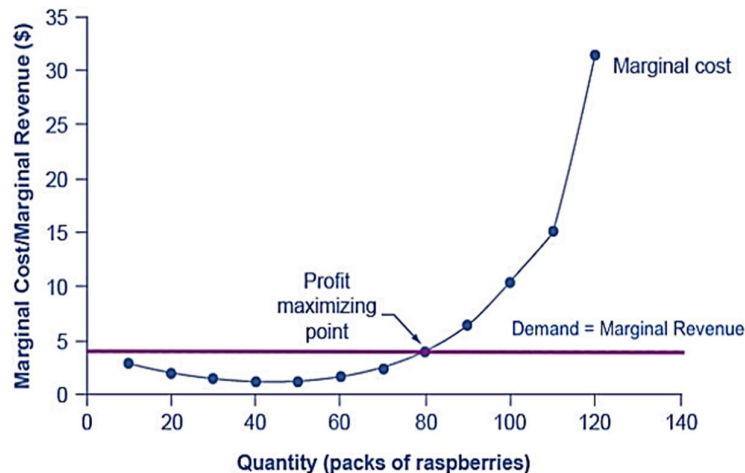


**Fig. 10.2 Profit Maximization Using Marginal Cost and Marginal Revenue**

Graphically, profit is maximized at the point where the Marginal Revenue (MR) curve intersects the Marginal Cost (MC) curve. This intersection provides a clear and specific condition for identifying the profit-maximizing level of output, making the MR-MC approach particularly valuable for precise and analytical economic evaluation.

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## 10.4 EQUILIBRIUM OF THE FIRM: TR-TC APPROACH

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The equilibrium of a firm under the Total Revenue – Total Cost (TR-TC) approach is established by identifying the output level at which the firm achieves maximum profit. This process involves analyzing various output levels to determine where the gap between total revenue and total cost is the widest. At this point, the difference—representing the firm's profit—is at its highest, indicating the optimal level of production for the firm.

### Key Components:

#### Total Revenue (TR):

Total revenue is the total income a firm receives from selling its goods or services. It is calculated as the price per unit (P) multiplied by the quantity of units sold (Q).

$$\text{Formula: } TR = P \times Q.$$

#### Total Cost (TC):

Total cost is the total expenditure incurred by a firm in producing a given level of output. It includes both fixed costs (costs that do not change with the level of output, such as rent and salaries) and variable costs (costs that vary with the level of output, such as raw materials and labor).

$$\text{Formula: } TC = \text{Fixed Costs} + \text{Variable Costs}.$$

#### Profit ( $\pi$ ):

Profit is the difference between total revenue and total cost. The goal of the firm is to maximize this difference.

$$\text{Formula: } \pi = TR - TC.$$

#### Steps to Determine Equilibrium:

The equilibrium of a firm using the Total Revenue - Total Cost (TR-TC) approach involves finding the output level where the firm's profit is maximized. The following steps outline the process to determine this equilibrium:

#### Calculate Total Revenue (TR):

**Identify Price and Quantity:** Determine the price per unit (P) and the quantity of units sold (Q).

**Formula:**  $TR = P \times Q$ .

**Example Calculation:** If a firm sells a product at \$10 per unit and sells 50 units,  $TR = \$10 \times 50 = \$500$ .

**Calculate Total Cost (TC):**

**Identify Fixed Costs and Variable Costs:** Determine the fixed costs (FC) and variable costs (VC) for different output levels.

**Formula:**  $TC = FC + VC$ .

**Example Calculation:** If fixed costs are \$100 and variable costs are \$2 per unit for 50 units,  $TC = \$100 + (\$2 \times 50) = \$200$ .

**Calculate Profit ( $\pi$ ):**

**Formula:**  $\pi = TR - TC$ .

**Example Calculation:** If  $TR = \$500$  and  $TC = \$200$ , then  $\pi = \$500 - \$200 = \$300$ .

**Graphical Representation:** Plot TR and TC on a graph with output (Q) on the x-axis and monetary values on the y-axis. The vertical distance between the TR and TC curves represents profit.

**Identify the Output Level for Maximum Profit:**

**Compare Profits for Different Output Levels:** Calculate TR, TC, and profit for various levels of output.

**Find Maximum Profit:** The equilibrium output level is where the profit is maximized (the greatest difference between TR and TC).

**Break-Even Points:**

**Identify Points Where  $TR = TC$ :** These are the break-even points where the firm makes zero profit.

**Importance of Operating Above Break-Even:** To ensure profitability, the firm aims to operate at output levels where TR exceeds TC.

**Graphical Analysis:**

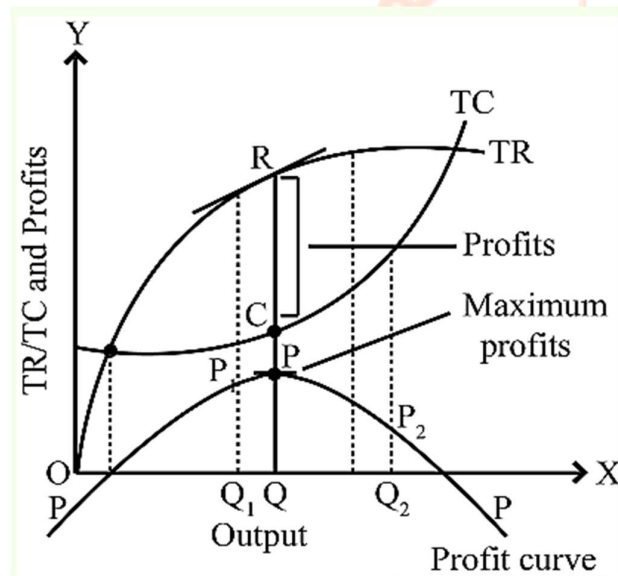


**Fig.10.3 Total Revenue, Total Cost, and Profit Maximization Curve**

**Plot TR and TC Curves:** Draw the TR curve starting from the origin and sloping upwards. Draw the TC curve starting above the origin (due to fixed costs) and sloping upwards.

**Determine Profit Maximization Point:** The highest point on the profit curve (difference between TR and TC) represents the equilibrium output level.

#### Example Calculation:

Consider a firm with the following cost structure:

- **Fixed Costs (FC):** \$100
- **Variable Costs (VC):** \$2 per unit
- **Price (P):** \$10 per unit

Calculate TR, TC, and profit for different output levels:

| Output<br>(Q) | TR =<br>$P \times Q$ | VC =<br>$\$2 \times Q$ | TC =<br>FC +<br>VC | Profit<br>= TR -<br>TC |
|---------------|----------------------|------------------------|--------------------|------------------------|
| 0             | \$0                  | \$0                    | \$100              | -\$100                 |
| 10            | \$100                | \$20                   | \$120              | -\$20                  |



|     |        |       |       |       |
|-----|--------|-------|-------|-------|
| 20  | \$200  | \$40  | \$140 | \$60  |
| 30  | \$300  | \$60  | \$160 | \$140 |
| 40  | \$400  | \$80  | \$180 | \$220 |
| 50  | \$500  | \$100 | \$200 | \$300 |
| 60  | \$600  | \$120 | \$220 | \$380 |
| 70  | \$700  | \$140 | \$240 | \$460 |
| 80  | \$800  | \$160 | \$260 | \$540 |
| 90  | \$900  | \$180 | \$280 | \$620 |
| 100 | \$1000 | \$200 | \$300 | \$700 |

In this example, the firm achieves maximum profit by producing 100 units of output, at which point the profit amounts to \$700.

### Check Your Progress

1. What is the TR-TC approach to determining the equilibrium of a firm?

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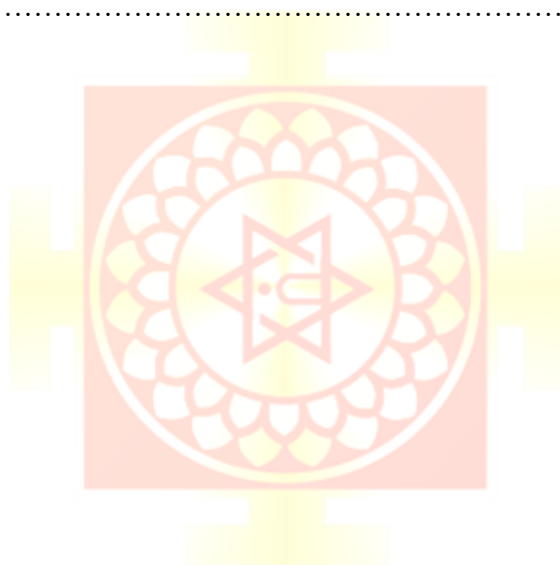
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2. Explain the MR-MC approach to firm equilibrium.

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## 10.5 EQUILIBRIUM OF THE FIRM: MR-MC APPROACH

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The MR-MC approach is a vital analytical tool used to determine a firm's equilibrium output level. It examines the incremental revenue and incremental cost resulting from the production of an additional unit of output. A firm reaches equilibrium—and thus maximizes profit—when marginal revenue (MR) equals marginal cost (MC). At this point, producing more or fewer units would lead to a decrease in profit.

### Key Components

#### 1. Marginal Revenue (MR)

- **Definition:** Marginal revenue refers to the **additional income** a firm earns by selling one extra unit of its product.
- **Calculation:**
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$$MR = \frac{\Delta TR}{\Delta Q}$$

Where:

$\Delta TR$  = Change in Total Revenue

$\Delta Q$  = Change in Quantity Sold

- **In Perfect Competition:** In a perfectly competitive market, **MR remains constant** and is equal to the **market price (P)** because each unit is sold at the same price.

#### 2. Marginal Cost (MC)

- **Definition:** Marginal cost is the additional expense a firm incurs to produce one more unit of output.
- **Calculation:**

$$MC = \frac{\Delta TC}{\Delta Q}$$

Where:

$\Delta TC$  = Change in Total Cost

$\Delta Q$  = Change in Quantity Produced

- **Cost Structure:** MC typically decreases initially due to increasing returns to scale and then increases due to diminishing returns.

**Steps to Determine Equilibrium:**

1. **Calculate Marginal Revenue (MR):**

- **Formula:**  $MR = \Delta TR / \Delta Q$
- Compute the additional revenue from selling one more unit of output.
- Example: If total revenue increases from \$100 to \$150 when output increases from 10 to 15 units,  $MR = (\$150 - \$100) / (15 - 10) = \$50 / 5 = \$10$ .

2. **Calculate Marginal Cost (MC):**

- **Formula:**  $MC = \Delta TC / \Delta Q$
- Compute the additional cost from producing one more unit of output.
- Example: If total cost increases from \$80 to \$130 when output increases from 10 to 15 units,  $MC = (\$130 - \$80) / (15 - 10) = \$50 / 5 = \$10$ .

3. **Determine the Equilibrium Output Level:**

- **Equilibrium Condition:** The firm is in equilibrium when  $MR = MC$ .
- **Profit Maximization:** At this point, the firm maximizes its profit because the cost of producing one more unit equals the revenue generated from selling that unit.

4. **Graphical Representation:**

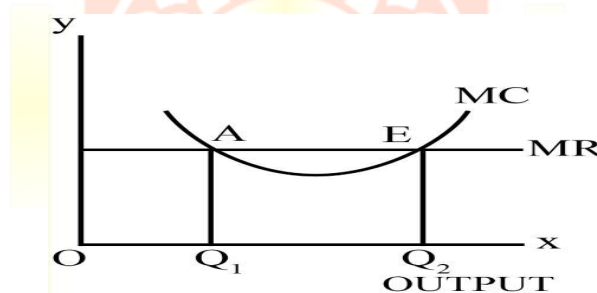


**Fig.10.4 Determine the Equilibrium Output Level**

The graph shows that the point of equilibrium is denoted as E, and the level of output at equilibrium is represented as OQ2. At point A, both MC and MR are equal. However, this does not represent equilibrium since beyond point A, MC is lower than MR. The company has a vested interest in increasing production in order to enhance profits. Hence, the equilibrium is reached only when the output level is such that  $MC=MR$ , and it is exceeded when  $MC>MR$ .

**Axes:** The x-axis represents the quantity of output, and the y-axis represents costs and revenue.

**MR and MC Curves:** Plot the MR and MC curves. The intersection point of these curves represents the equilibrium output level.

**Profit Analysis:** Below the equilibrium point,  $MR > MC$ , indicating that producing additional units will increase profit. Above the equilibrium point,  $MR < MC$ , indicating that producing additional units will decrease profit.

**Example:**

Suppose a firm sells a product in a perfectly competitive market at \$10 per unit. The firm's cost structure is as follows:

| Output (Q) | Total Revenue (TR) | Total Cost (TC) | Marginal Revenue (MR) | Marginal Cost (MC) |
|------------|--------------------|-----------------|-----------------------|--------------------|
| 0          | \$0                | \$100           | -                     | -                  |
| 10         | \$100              | \$120           | \$10                  | \$2                |
| 20         | \$200              | \$140           | \$10                  | \$2                |
| 30         | \$300              | \$170           | \$10                  | \$3                |
| 40         | \$400              | \$210           | \$10                  | \$4                |
| 50         | \$500              | \$260           | \$10                  | \$5                |

- **Equilibrium Output:**

The equilibrium output level is where  $MR = MC$ .

In this example,  $MR = \$10$  consistently (as it's a perfectly competitive market), and  $MC = \$10$  at the output level of 50 units.

**Analysis:**

- **Profit Maximization:**

The firm should produce up to the point where  $MR$  equals  $MC$  to maximize profit.

Producing beyond this point would result in higher costs than revenue for additional units, reducing overall profit.

- **Efficiency:**

This approach ensures that resources are allocated efficiently, as firms produce only up to the level where the additional cost of production matches the additional revenue.

- **Economic Insights:**

The  $MR-MC$  approach provides a clear framework for understanding how firms make production decisions to maximize profitability.

It highlights the importance of marginal analysis in managerial decision-making.

The  $MR-MC$  approach is a fundamental method for determining the equilibrium of a firm. It focuses on the relationship between marginal revenue and marginal cost, guiding firms to the output level that maximizes profit and ensures efficient resource allocation. In conclusion, while both the  $TR-TC$  and  $MR-MC$  approaches aim to determine the equilibrium of the firm, they do so through different methodologies. The  $TR-TC$  approach offers a broad overview of profitability, while the  $MR-MC$  approach provides precise and detailed insight into marginal changes. Understanding both approaches equips

firms with comprehensive tools for making informed production and profit maximization decisions.

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## 10.6 SUMMARY

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In this unit, we examined two fundamental approaches to determining a firm's equilibrium: the Total Revenue – Total Cost (TR-TC) approach and the Marginal Revenue – Marginal Cost (MR-MC) approach. The TR-TC method identifies the profit-maximizing output level by finding the point where the difference between total revenue and total cost is at its maximum, offering a clear and intuitive understanding of firm behavior. In contrast, the MR-MC approach focuses on the marginal conditions for profit maximization, where equilibrium is achieved when marginal revenue equals marginal cost. This method provides a more precise and analytical framework, particularly useful for detailed economic analysis and decision-making. Both approaches emphasize the importance of understanding revenue and cost dynamics in optimizing production and profitability. Their comparison highlights distinct advantages and applications across various market structures, from perfect competition to monopoly. Furthermore, the unit demonstrated the practical relevance of these concepts by showing how firms can apply them to real-world scenarios to enhance efficiency and profitability. A solid grasp of these equilibrium principles enables students to better analyze firm behavior, make informed business decisions, and approach economic challenges with a strong foundation in microeconomic theory.

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## 10.7 GLOSSARY

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- **Total Revenue (TR):** The total income received by a firm from selling its goods or services. It is calculated as Price (P) multiplied by Quantity (Q).

- **Total Cost (TC):** The complete cost a firm incurs to produce a specific quantity of output, comprising both fixed and variable costs.
- **Marginal Revenue (MR):** The extra income a firm earns from selling one additional unit of output. It is calculated by dividing the change in total revenue by the change in quantity sold ( $\Delta TR/\Delta Q$ ).
- **Marginal Cost (MC):** The additional cost incurred when a firm produces one more unit of output, calculated as the change in total cost divided by the change in quantity produced ( $\Delta TC/\Delta Q$ ).
- **Profit Maximization:** The strategy of producing the level of output that yields the highest possible profit, achieved when the gap between total revenue and total cost is at its widest.
- **Break-even Point:** The output level at which a firm's total revenue exactly matches its total cost, resulting in zero profit but covering all expenses.
- **Short-Run:** A production period during which at least one input remains fixed, meaning the firm can change output levels but not all production factors like capital or plant size.
- **Long-Run:** A time period in which all inputs can be varied, allowing firms to adjust their production scale fully and enter or exit the market freely; in perfect competition, this leads to normal (zero economic) profits.
- **Perfect Competition:** A market form where numerous small firms sell identical products, none of which can influence the market price. Firms are price takers and face no barriers to entry or exit.
- **Market Equilibrium:** A situation where the quantity of goods demanded by consumers equals the quantity supplied by producers, resulting in a stable price and quantity in the market.



- **Economic Profit:** The surplus remaining after all explicit and implicit costs are deducted from total revenue, indicating returns above the normal profit or opportunity cost.
- **Allocative Efficiency:** An optimal distribution of resources where goods and services are produced according to consumer preferences. In perfectly competitive markets, this occurs when price equals marginal cost ( $P = MC$ ).
- **Total Cost (TC):** The total expenditure incurred by a firm in producing a given level of output, including both fixed and variable costs.
- **Marginal Revenue (MR):** The additional revenue generated from selling one more unit of output. It is the change in total revenue divided by the change in quantity sold ( $\Delta TR/\Delta Q$ ).
- **Marginal Cost (MC):** The additional cost incurred from producing one more unit of output. It is the change in total cost divided by the change in quantity produced ( $\Delta TC/\Delta Q$ ).
- **Profit Maximization:** The process by which a firm determines the output level that results in the highest possible profit, achieved when the difference between total revenue and total cost is maximized.
- **Break-even Point:** The output level at which total revenue equals total cost, resulting in zero economic profit. At this point, the firm covers all its costs but does not make a profit.
- **Short-Run:** A period during which at least one of a firm's inputs is fixed. Firms can adjust production levels but cannot change their fixed inputs, such as plant size or equipment.
- **Long-Run:** A period during which all inputs can be varied. Firms can adjust all factors of production and enter or exit the market, leading to zero economic profit in perfectly competitive markets.

- **Perfect Competition:** A market structure characterized by many small firms producing identical products, with no single firm able to influence the market price. There is free entry and exit of firms, and all firms are price takers.
- **Market Equilibrium:** A state in which the quantity demanded by consumers equals the quantity supplied by producers, resulting in a stable market price and output level.
- **Economic Profit:** The difference between total revenue and total cost, where total cost includes both explicit and implicit costs. Positive economic profit indicates that a firm is earning more than its opportunity cost.
- **Allocative Efficiency:** A state of resource allocation in which the mix of goods and services produced represents the preferences of consumers. In perfect competition, this is achieved when price equals marginal cost ( $P = MC$ ).

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## 10.8 EXERCISES

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1. What is the Total Revenue - Total Cost (TR-TC) approach, and how does it determine the equilibrium of a firm?  
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2. Explain the Marginal Revenue - Marginal Cost (MR-MC) approach to determining firm equilibrium.  
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3. How do you calculate total revenue and total cost? Provide examples.  
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4. Describe the condition for profit maximization under the MR-MC approach.
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5. Compare and contrast the TR-TC and MR-MC approaches to determining firm equilibrium.
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## 10.9 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics (9th ed.). Pearson.
2. Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach (9th ed.). W.W. Norton & Company.
3. "Profit Maximization in the Short Run" - Available on JSTOR.
4. "Firm Behavior under Different Market Structures" - Published in the Journal of Economic Perspectives.
5. Khan Academy: Microeconomics - Firm Behavior and Market Structure
6. Investopedia: Marginal Cost and Marginal Revenue
7. <https://courses.lumenlearning.com/wm-microeconomics/chapter/profit-maximization-in-a-perfectly-competitive-market/>

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## **UNIT 11: PERFECT COMPETITION: SHORT RUN AND LONG RUN SUPPLY CURVE**

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### **STRUCTURE**

- 11.1 Introduction
- 11.2 Objectives
- 11.3 Key Concepts
  - 11.3.1 Perfect Competition
  - 11.3.2 Short-Run Supply Curve
  - 11.3.3 Long-Run Supply Curve
  - 11.3.4 Market Equilibrium
- 11.4 Characteristics of Perfect Competition
- 11.5 Long-Run Supply Curve in Perfect Competition
- 11.6 Short-Run Supply Curve in Perfect Competition
- 11.7 Short-Run vs. Long-Run Equilibrium
- 11.8 Efficiency in Perfect Competition
- 11.9 Summary
- 11.10 Glossary
- 11.11 Unit End Exercises
- 11.12 Suggested Readings

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### **11.1 INTRODUCTION**

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In this unit, we delve into the intricate dynamics of perfect competition, a market structure epitomized by numerous small firms, homogeneous products, free entry and exit, and perfect information. This framework posits that firms are price takers, unable to influence market prices individually. We will dissect the nuances of the short-run and long-run supply curves within this context. In the short run, firms face fixed inputs and capacity constraints, leading to supply decisions based on marginal costs. The short-run supply curve is pivotal for understanding firms' production decisions and market responses to price changes. Conversely, the long-run supply curve emerges when all inputs can be varied, and firms can freely enter or exit the market, driving the industry

towards zero economic profit equilibrium. This transition highlights the market's self-correcting mechanism, ensuring that firms operate efficiently. We will explore how these theoretical constructs manifest in real-world markets, providing a comprehensive understanding of resource allocation and economic efficiency. By examining the conditions under which these supply curves operate, the unit aims to elucidate the principles of market behavior, the achievement of equilibrium, and the broader implications for economic policy and regulation. Understanding these foundational concepts equips us with the analytical tools to evaluate the effectiveness of competitive markets in promoting welfare and guiding economic activity.

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## 11.2 OBJECTIVES

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After studying this unit, you should be able to:

1. Explain the characteristics of perfect competition.
2. Differentiate between short-run and long-run supply curves in a perfectly competitive market.
3. Analyze how firms determine output and pricing in the short run.
4. Describe the process through which long-run equilibrium is achieved in perfect competition.
5. Evaluate the implications of perfect competition for economic efficiency and resource allocation.

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## 11.3 KEY CONCEPTS

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### *11.3.1 Perfect Competition*

Perfect competition is a type of market structure distinguished by several key traits, such as numerous small firms, standardized products, unrestricted market entry and exit, and full access to market information. In this scenario, individual firms have no control over pricing and must

accept the market-determined price. Since a single firm's production does not impact the overall market price, all firms function as price takers. This system fosters efficient resource utilization, ensuring that prices accurately represent production costs. Competition is primarily based on price and cost efficiency, leading to an optimal allocation of resources that benefits both consumers and producers.

**11.3.2 Short-Run Supply Curve** Short-Run Supply Curve in Perfect Competition: The short-run supply curve in a perfectly competitive market illustrates the relationship between the price of a good and the quantity that firms are willing to supply when at least one input remains fixed. Due to constraints such as capital or land, firms cannot fully adjust their inputs in the short run. The short-run supply curve corresponds to the portion of the firm's marginal cost (MC) curve that lies above the average variable cost (AVC). Firms will continue producing until the price equals marginal cost ( $P = MC$ ), aiming to either maximize profits or minimize losses. This curve demonstrates how firms respond to price fluctuations while facing short-term limitations in adjusting their production capacity.

**Long-Run Supply Curve** Unlike the short-run supply curve, the long-run supply curve represents a period when all inputs are variable, allowing firms to make full adjustments to their production levels. Over time, firms enter or exit the market based on economic profits or losses, ultimately leading to a situation where only normal profits are earned, covering all costs. The shape of the long-run supply curve depends on industry characteristics: in a constant-cost industry, it remains perfectly elastic (horizontal); in an increasing-cost industry, it slopes upward; and in a decreasing-cost industry, it slopes downward. The long-run supply curve thus illustrates the total market supply at various price levels after firms have fully adapted to changes in demand.

### *Market Equilibrium in Perfect Competition*

*Market equilibrium occurs when the quantity demanded equals the quantity supplied at a given market price. In the short run, equilibrium is established where the market demand and supply curves intersect, with firms producing at the point where  $P = MC$ . However, in the long run, equilibrium is reached when firms enter or exit the industry until no excess profits remain, meaning firms earn only enough to cover opportunity costs. This long-run equilibrium ensures efficient resource allocation, as firms produce at the lowest point of their average total cost (ATC) curve, achieving both allocative and productive efficiency. At this stage, the market clears without surplus or shortage, maintaining a balance between supply and demand.*

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## **11.4 CHARACTERISTICS OF PERFECT COMPETITION**

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Perfect competition is an idealized market structure that serves as a reference point for analyzing real-world markets. It is defined by several key characteristics:

### **1. Large Number of Small Firms**

A perfectly competitive market consists of numerous firms, each contributing only a small portion of total market output. No individual firm has enough influence to affect the overall market price. This ensures that the market remains highly competitive, with firms acting as price takers rather than price makers.

### **2. Homogeneous Products**

All firms in this market structure produce identical goods, meaning there is no differentiation in quality, branding, or features. Since consumers see no difference between products from different suppliers, price becomes the sole factor influencing purchasing decisions.

### **3. Free Entry and Exit**



There are no significant barriers preventing firms from entering or leaving the market. If firms experience high profits, new firms will enter, increasing supply and pushing prices down. Conversely, if firms face losses, some will exit, reducing supply and allowing prices to stabilize. This mechanism ensures that economic profits are eliminated in the long run.

#### **4. Perfect Information**

All buyers and sellers have complete access to information regarding prices, product quality, and production techniques. This transparency prevents firms from charging higher prices than the market rate, as consumers can easily switch to other suppliers offering the same product at a lower price.

#### **5. Price Takers**

Firms in perfect competition have no control over the price of their product. Instead, market forces of supply and demand determine the price, and firms must accept it. Since individual firms produce only a small share of total output, their decisions do not impact market prices.

#### **6. Profit Maximization**

To maximize profits, firms produce at the level where marginal cost (MC) equals marginal revenue (MR), which, in a perfectly competitive market, is also equal to the market price (P). This condition, represented as  $P = MC = MR$ , ensures firms operate at maximum efficiency.

#### **7. Normal Profits in the Long Run**

Due to the absence of entry barriers, firms in a perfectly competitive market earn only normal profits over the long term. If firms earn excess profits, new competitors enter the market, increasing supply and lowering prices until profits return to normal levels. Conversely, if firms incur losses, some exit, reducing supply and raising prices until remaining firms earn just enough to cover their opportunity costs.

Let's use a diagram to illustrate the short-run and long-run equilibrium in perfect competition.

### Short-Run Equilibrium:

Since all businesses under perfect competition are indistinguishable, we may regard any one company as a representative of the others.

Let  $q$  represent the amount of production generated by the firm.

The function  $C(q)$  represents the cost function.

$p$  represents the cost of each individual unit of the product.

$\Pi$  represents the variable for profit.

The profit function of the company may be determined using these factors.

The profit equation,  $\Pi = TR - TC$ , represents the difference between total revenue (TR) and total cost (TC). This can be expressed as the product of price ( $p$ ) and quantity ( $q$ ) minus the total cost function  $C(q)$ . to maximize profit, we take the derivative of profit ( $\Pi$ ) with respect to quantity ( $q$ ) and set it to zero:

$$\frac{\partial \Pi}{\partial q} = p - \frac{\partial C}{\partial q}$$

This condition implies that price ( $p$ ) must be equal to marginal cost (MC). Under perfect competition, firms produce at the output level where the market price ( $p$ ) equals marginal cost (MC). At the profit-maximizing level of output, marginal revenue (MR) also equals price ( $p$ ), reinforcing the condition that  $p = MC$  for optimal production.

Visually, we may depict these circumstances using diagrams:

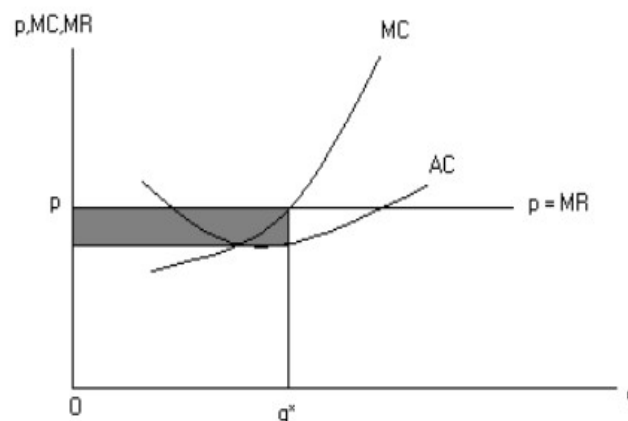


**Fig. 11.1: Short-run Equilibrium of Firm**

The diagram depicts the firm's short-run average cost curve (AC) and marginal cost curve (MC). The MC curve intersects the AC curve at its lowest point. The price level ( $p$ ) determines the shape of the marginal revenue (MR) and average revenue (AR) curves, which appear as a horizontal line. The firm's equilibrium is established where the MC curve intersects the price line. By extending a vertical line from this intersection down to the horizontal axis, we identify the equilibrium output, labeled as  $OQ^*$ . The shaded region in the graph represents the firm's profit when operating at this optimal production level, denoted as  $OQ$ .

### Maximizing profits in the short Run

The stable equilibrium point is determined by the junction of the MR and MC curves.

With the exception of point  $q^*$ , the company would revert to the equilibrium output level. If the quantity demanded ( $q$ ) is less than the equilibrium quantity ( $q^*$ ), then the marginal cost (MC) is less than the marginal revenue (MR), causing the quantity to increase. Conversely, if the quantity is more than the equilibrium quantity, the marginal cost is greater than the marginal revenue, leading to a decrease in quantity.

In the immediate term, the company would generate a profit represented by the shaded region. This statement is true for all the companies since they are all similar.

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## 11.5 SHORT-RUN SUPPLY CURVE IN PERFECT COMPETITION

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### Supply Curve of Firm and Industry

The company will create a quantity of product where the marginal revenue (MR) is equal to the marginal cost (MC), given a certain pricing. Thus, if the marginal cost (MC) curve is positioned above the average variable cost (AVC), it would represent the supply curve of the company. The segment of the marginal cost (MC) curve that is below the average variable cost (AVC) curve does not reflect the supply curve. This is because in that area, the company would cease its operations.

The rationale for it is shown by the following evidence:

If  $p < AVC$ , then  $pq < (AVC)q$ , which implies that  $TR < TVC$ .

Therefore,  $TR < TC - TFC$ , and  $TC - TR > TFC$ . Consequently,

The loss experienced by the business is larger than the entire fixed cost. If the firm closes down, it will only have to pay the fixed cost.

### Firm's Supply Curve

The supply curve of the company may be represented graphically as the upward-sloping portion of the marginal cost (MC) curve that is situated above the average variable cost (AVC) curve. When the average variable cost (AVC) curve is below, the supply curve will align with the vertical axis. Consequently, the supply curve would be disrupted, as seen in Figure 11.2.

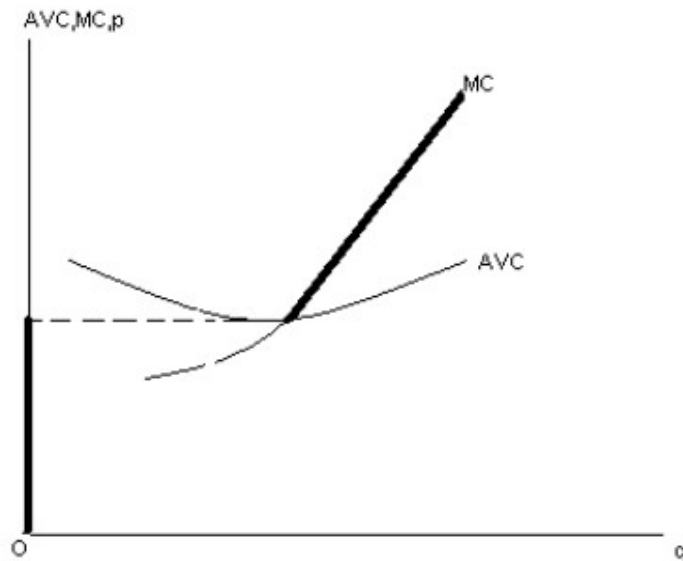


**Fig.11. 2: Supply Curve of the Firm**

#### **Mathematical Representation**

Let the cost function of the  $i^{\text{th}}$  firm be  $C = C_i(q_i)$

The marginal cost,  $MC = \partial C_i(q_i) / \partial q_i = C'_i(q_i)$

Given the market price ( $p$ ) the supply function of the firm is given by,

$$S_i = S_i(P) \text{ for } p \geq \min AVC$$

$$= 0 \quad \text{for } p < \min AVC$$

The aggregate supply function or the supply function of the industry is given by

$$S = \sum S_i(p) = S(p)$$

#### **Supply Curve of Industry:**

The industry supply may be calculated by aggregating the supply of all the enterprises. The industry supply may be calculated as the sum of the quantities produced by each business, denoted as  $q_i$ , multiplied by the price  $p$ , for all  $N$  companies in the industry, where  $i$  ranges from 1 to  $N$ .

If the companies are all similar, then the function  $q_i(p)$  is constant for all businesses. If we assume that  $q_i$  is equal to  $q$ , then the overall supply of the industry may be represented as  $S = N \cdot q$ .

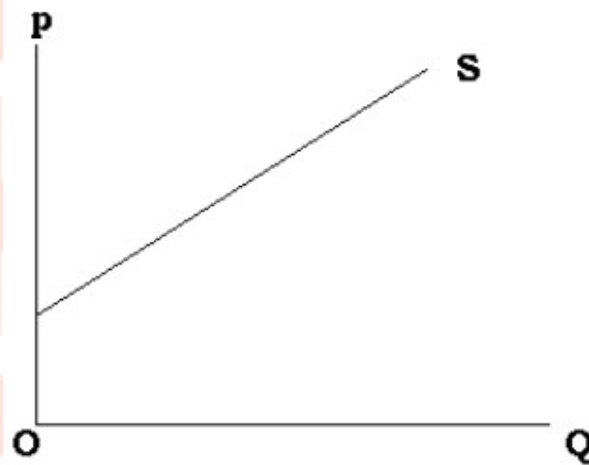


**Fig.11. 3: Supply Curve of the Industry**

The industry supply curve  $S$  represents the aggregate of all the individual supply curves of the enterprises now operating in the market.

#### **An Illustrative Numerical Case**

Let the total cost curve be  $C_i = 0.1q_i^3 - 2q_i^2 + 15q_i + 10$

Then ,  $MC_i = 0.3q_i^2 - 4q_i + 15$

Setting  $MC_i = p$ , we have,

$$p = 0.3q_i^2 - 4q_i + 15$$

This is a quadratic equation in  $q_i$ , therefore,

$$q_i = [4 + (10 + 1.2p)] / 0.6 \quad [4 - (10 + 1.2p)] / 0.6$$

The supply function of an individual business is applicable for all values of  $p$  greater than or equal to the minimal average variable cost (AVC).

The AVC function is  $AVC_i = 0.1q_i^2 - 2q_i + 15$

The minimum point on the AVC is located by taking derivative with respect to  $q_i$  and setting the derivative equal to zero, as shown below.

$$d(AVC_i)/dq_i = 0.2q_i - 2 = 0$$

Therefore,  $q_i = 10$ .

Substituting  $q_i = 10$  in the AVC function we get,

minimum  $AVC = 5$ .

Therefore, the firm supply function is

$$\begin{aligned} S_i &= [4 \pm (1.2p - 2)]/0.6 && \text{for } p \geq 5 \\ &= 0 && \text{for } p < 5 \end{aligned}$$

If the industry consists of 100 identical firms, the aggregate supply function is

$$\begin{aligned} S &= 100 \times [4 \pm (1.2p - 2)]/0.6 && \text{for } p \geq 5 \\ &= 0 && \text{for } p < 5 \end{aligned}$$

At a price of 22.5, the aggregate supply would be 1500 units.

### Industry's short-run equilibrium

The equilibrium price and production in the market are set at the point where the industry demand and supply curves intersect. The equilibrium state is shown in the accompanying figure, assuming a linear and downward sloping market demand curve.

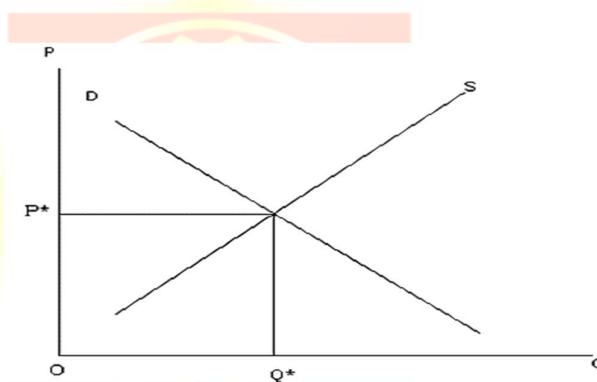


**Fig.11. 4: Industry Equilibrium**



The equilibrium pricing and output in the industry are represented as Perfect Competition \*  $op$  and  $OQ^*$  correspondingly.

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## 11.6 LONG-RUN SUPPLY CURVE IN PERFECT COMPETITION

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Over time, all the resources that enterprises have access to adjusted, therefore the idea of fixed cost is not applicable and the total cost (TC) is equivalent to the total variable cost (TVC). Thus, we simply need to address the long-term average cost ( $LAC = LTC/q$ ). The LAC is assumed to have a U-shaped curve, indicating that costs decrease at low levels of production and increase beyond a certain amount.

As mentioned before, a completely competitive market is defined by the unrestricted ability of enterprises to enter and leave the market. Due to the short-term profitability of enterprises, new firms will enter the market. Consequently, the increase in industry supply would lead to a decrease in pricing. This process would continue until the profits reach a point of complete depletion.

**The graphic below illustrates the stated technique.**

In the long run, firms in perfect competition can adjust all their inputs. This flexibility allows them to change their scale of production based on market conditions, such as increasing output in response to higher demand or reducing production when demand decreases.

### Entry and Exit

Perfectly competitive markets allow for free entry and exit of firms. When firms in the market are earning economic profits ( $P > ATC$ ), new firms are attracted to enter the market to capture these profits. This increase in the number of firms expands market supply, leading to a reduction in market price until profits are driven to zero. Conversely, if firms are experiencing losses ( $P < ATC$ ), some firms will exit the market, reduce market supply and cause prices to rise until remaining firms earn normal profits.

In perfect competition, the long-run supply curve reflects how firms adjust their production levels when all inputs can be varied and firms can freely enter or exit the market. Here's a breakdown of how the long-run supply curve behaves in different industry types:

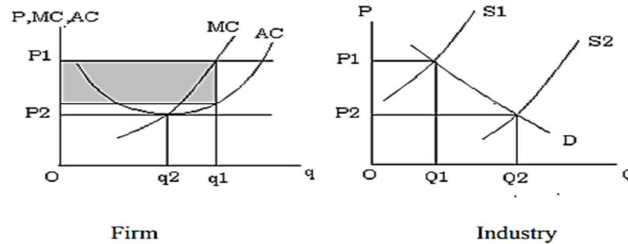


**Figure 11.5 displays the long-run profit of a competitive firm.**

Figure 11.5 shows the pricing. The business, denoted as P1, is now generating a quantity of output,  $q_1$ , which results in a profitable outcome. This profitability is visually represented by the shaded region. At a price of P1, the industry produces an output of Q1. As the current companies are generating profits, new businesses will enter the market. Consequently, the overall supply in the market would increase, leading to a decrease in market price. If the businesses are still generating profit at the increased price, then other enterprises will enter the market and increase the overall supply.

As a result, the price would decrease to a lower level. This practice will continue until the price reaches a point where all gains are eradicated. According to the diagram, the colored region no longer exists. The price of this item is P2, where P represents the marginal cost (MC) and average cost (AC). As a result, the profit is equal to zero.

In the zero-profit scenario, enterprises experience an economic profit of zero, indicating that they do not earn any more than they would in other locations. Put simply, the companies are reaching a point of equilibrium at price P2.

At point P2, when businesses are making no profit, there is no motivation for more firms to join the sector. Therefore, price P2 would

indicate a state of balance in the market, where  $Q_2$  is the optimal amount of production. The long-run equilibrium is defined as a state in which the enterprises experience zero economic profits.

**Long-term Firm Stability: Plant Selection and Adjustment Process**

Over time, an entrepreneur has the ability to modify the size of their business facility. She has the opportunity to choose the most efficient plant size, which would decrease the cost. The process of adjustment is shown using the diagram provided.

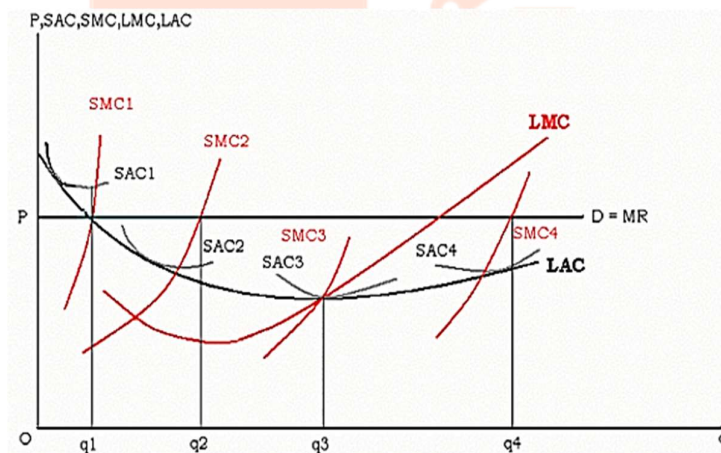


**Figure 11.6 illustrates the long-term changes in a firm's plant capacity.**

Let  $OP$  represent the market price. The company has a plant of a certain size, and the expenses associated with this size are represented by the short-run average cost ( $SAC_1$ ) and short-run marginal cost ( $SMC_1$ ). Given the current size of the plant, the short-run equilibrium is reached when the business generates a quantity of output equal to  $q_1$ . The company incurs a financial loss due to the fact that the price line is positioned below the  $SAC_1$  curve. In this scenario, the company has two alternatives: either to cease operations or to build a factory of a more appropriate size.

Over time, the company may choose to expand the size of the facility in

order to build a bigger factory, as shown by SAC2 and SMC2 in the diagram. At the given pricing, the business with this new plant size would create  $Q_2$  quantity of output, resulting in a certain level of profit. If the company had complete foresight, it would choose to use the SAC4 facility, which yields the most profitability.

The graphic below illustrates the process of long-term adjustment and the selection of a plant for the company.

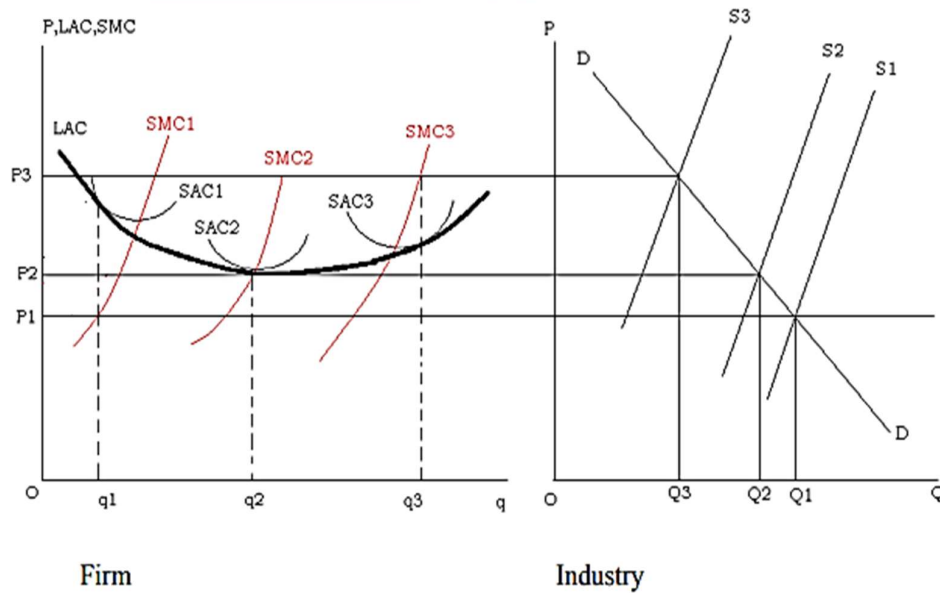


**Figure 11.7 illustrates the long-run equilibrium in the industry.**

Assume that the beginning price is  $OP_1$  and the corporation only has plant 3, which is represented by SAC3. When the production level is set at  $P = SMC$ , it results in the production of  $Oq_3$  and generates a certain amount of profit due to the fact that  $OP_3$  is more than SAC3. As the business generates profit, it will draw new entrants to the sector. Consequently, the supply in it would increase from  $OQ_3$  to  $OQ_1$  and the price would decrease from  $OP_3$  to  $OP_1$ . As a result, the supply curve would move from  $S_3$  to  $S_1$ .

At price  $OP_1$ , the representative company is incurring a loss since the price  $OP_1$  is lower than the average cost  $SAC_1$ .

Consequently, the current companies would begin to withdraw from the industry. Consequently, there would be a decrease in the quantity of goods available in the market, causing the supply curve to move backwards from  $S_1$ . As the supply curve moves, the price would decrease, according to the market demand curve  $DD$ .

Assume that the price stabilizes at  $OP_2$ . At this pricing, the values of  $P_2$ ,  $SMC_2$ , and  $SAC_2$  are equal, resulting in neither a loss nor a gain for the representative company. The new enterprises would lack any motivation to join the market, and the current firms would have no desire to exit the sector. Therefore, the industry would reach an equilibrium state with a price of  $OP_2$  and a production of  $OQ_2$ . The firm's equilibrium output is  $Oq_2$ .

The long-run supply curve in perfect competition provides insights into how firms adjust their production levels over time. The shape of the curve whether horizontal, upward sloping, or downward sloping depends on the industry's cost structure and the dynamics of entry and exit. This analysis underscores the role of competition in driving prices towards cost levels and ensuring efficient allocation of resources in the long run.

### Check Your Progress

1. What are the main characteristics of perfect competition?

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2. How is the short-run supply curve of a firm derived under perfect competition?

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## 11.7      SHORT-RUN      VS.      LONG-RUN EQUILIBRIUM

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### Short-Run Equilibrium

Short-run equilibrium in perfect competition occurs when firms produce at a point where marginal cost (MC) equals price (P), but they can experience economic profits or losses due to fixed inputs and capacity constraints. In this period, firms adjust their production levels to maximize profits or minimize losses based on the prevailing market price. If price exceeds average total cost (ATC), firms earn economic profits; if price is below ATC but above average variable cost (AVC), firms incur losses but continue to produce to cover variable costs.

### Long-Run Equilibrium

Long-run equilibrium in perfect competition is achieved when firms in the market have adjusted their scale of production through entry or exit until economic profits are zero. At this equilibrium point, firms produce at the minimum point of their long-run average cost (LRAC) curve, where price (P) equals both marginal cost (MC) and average total cost (ATC). Firms earn only normal profits, covering all opportunity costs including a normal return on capital. This state signifies that resources are allocated efficiently, with firms producing at the lowest possible cost per unit and prices reflecting the true cost of production.

### Conclusion

Distinguishing between short-run and long-run equilibrium in perfect competition underscores the dynamic nature of market adjustment over time. Short-run equilibrium reflects immediate responses to price signals within fixed production capacities, whereas long-run equilibrium involves the entry and exit of firms to achieve zero economic profits and optimal resource allocation. Understanding these concepts illuminates how competitive markets achieve efficiency and



stability, ensuring that consumer and producer surpluses are maximized in the long run.

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## 11.8 EFFICIENCY IN PERFECT COMPETITION

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Efficiency in perfect competition refers to the optimal allocation of resources and the achievement of economic efficiency within a market characterized by perfect competition. There are two main types of efficiency that are typically discussed in this context:

### 1. Allocative Efficiency

Allocative efficiency occurs when resources are allocated in such a way that the production of goods and services reflects consumer preferences. In perfect competition, allocative efficiency is achieved because:

- **Price Equals Marginal Cost ( $P = MC$ ):** Each firm in a perfectly competitive market produces up to the point where marginal cost (MC) equals the market price (P). This ensures that resources are allocated to produce goods and services that consumers value the most relative to their cost of production.
- **Consumer Sovereignty:** In a competitive market, consumers have the freedom to choose among products based on their preferences and willingness to pay. Firms respond to consumer demand signals (reflected in prices) by adjusting their production levels accordingly.
- **No Externalities:** Perfectly competitive markets assume no external costs or benefits associated with production or consumption. Therefore, the market price reflects the true cost of production, and firms do not over- or under-produce goods that generate positive or negative externalities.



Allocative efficiency ensures that the combination of goods and services produced maximizes total societal welfare. In other words, resources are used in a way that maximizes the satisfaction of consumer wants and needs given the available resources.

## 2. Productive Efficiency

Productive efficiency occurs when goods and services are produced at the lowest possible cost. In perfect competition, productive efficiency is achieved because:

- **Cost Minimization:** Firms in perfectly competitive markets have incentives to minimize costs in order to maximize profits. They achieve this by operating at the lowest point on their average cost curve (AC or ATC), where each unit of output is produced at the lowest possible cost.
- **Technological Efficiency:** Competitive pressures encourage firms to adopt efficient production techniques and technologies. Firms that fail to minimize costs risk being outcompeted by more efficient producers.
- **Dynamic Efficiency:** Over time, firms in competitive markets innovate and improve their production processes to reduce costs further. This continual improvement fosters dynamic efficiency, ensuring that resources are used efficiently in the long run.

Efficiency in perfect competition is driven by the twin goals of allocative efficiency allocating resources to reflect consumer preferences and productive efficiency producing goods and services at the lowest possible cost. These characteristics make perfect competition a benchmark for economic efficiency, demonstrating how competitive markets can lead to optimal resource allocation and economic welfare.

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## 11.9 SUMMARY

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In this unit, we have comprehensively examined the structure and implications of perfect competition, focusing on the behavior of firms in both the short run and the long run. We explored the defining characteristics of perfect competition, such as numerous small firms, homogeneous products, free entry and exit, and perfect information, all of which ensure that firms are price takers. The short-run supply curve was analyzed, highlighting how firms make production decisions based on marginal costs while dealing with fixed inputs. We then transitioned to the long-run supply curve, where all inputs are variable, allowing firms to adjust fully and new firms to enter or exit the market. This leads to a state of zero economic profit equilibrium, illustrating the market's self-regulating nature. We also discussed the efficiency outcomes associated with perfect competition, including allocative and productive efficiency, which ensure optimal resource allocation and minimum production costs. By contrasting perfect competition with other market structures and considering empirical evidence and policy implications, this unit provides a robust framework for understanding how competitive markets function and the economic principles that drive them.

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## 11.10 GLOSSARY

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- **Perfect Competition:** A market structure characterized by many firms, identical products, free entry and exit, and perfect information.
- **Short-Run Supply Curve:** The curve that shows the quantity a firm is willing to supply at different prices when some inputs are fixed.

- **Long-Run Supply Curve:** The curve that shows the quantity a firm is willing to supply at different prices when all inputs can be varied.
- **Marginal Cost (MC):** The additional cost of producing one more unit of output.
- **Average Variable Cost (AVC):** The variable cost per unit of output.
- **Average Total Cost (ATC):** The total cost per unit of output.
- **Allocative Efficiency:** A state where resources are allocated in a way that maximizes total surplus, achieved when  $P = MC$ .
- **Productive Efficiency:** A state where goods are produced at the lowest possible cost, achieved at the minimum point of the ATC curve.

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## 11.11 EXERCISES

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1. Define the characteristics of a perfectly competitive market.

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2. Explain how the short-run supply curve of a firm is derived in perfect competition.

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3. Describe the differences between the long-run supply curve and the short-run supply curve in perfect competition.

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4. Discuss the conditions under which a firm reaches short-run equilibrium in a perfectly competitive market.

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5. Explain what occurs in the market when firms earn economic profits in the short run and how this affects the long-run equilibrium.

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## 11.12 SUGGESTED READINGS

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1. Samuelson, P.A., & Nordhaus, W.D. (2010). *Economics*. McGraw-Hill Education.
2. Varian, H.R. (2014). *Intermediate Microeconomics: A Modern Approach*. W.W. Norton & Company.
3. Mankiw, N.G. (2014). *Principles of Microeconomics*. Cengage Learning.
4. Stigler, G.J. (1957). *Perfect Competition, Historically Contemplated*. Journal of Political Economy.
5. Arrow, K.J., & Debreu, G. (1954). *Existence of an Equilibrium for a Competitive Economy*. Econometrica.

### Online Resources:

6. Khan Academy: *Perfect Competition*  
(<https://www.khanacademy.org/economics-finance-domain/microeconomics/perfect-competition-topic>)

7. Investopedia: *Perfect Competition Definition*
8. (<https://www.investopedia.com/terms/p/perfectcompetition.asp>)
9. <https://egyankosh.ac.in/bitstream/123456789/22876/1/Unit-7.pdf>



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## **UNIT 12: CHALLENGES TO PERFECT COMPETITION EQUILIBRIUM: KALDOR AND SARAFFA'S INCOMPATIBILITY OF EQUILIBRIUM IN PERFECT COMPETITION**

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### **STRUCTURE**

- 12.1 Introduction
- 12.2 Objectives
- 12.3 Key Concepts
- 12.4 Challenges to Perfect Competition Equilibrium
- 12.5 Nicholas Kaldor's Critique of Perfect Competition
- 12.6 Saraffa's Incompatibility of Equilibrium
- 12.7 Critique and Analysis
- 12.8 Summary
- 12.9 Glossary
- 12.10 Exercises
- 12.11 Suggested Readings

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### **12.1 INTRODUCTION**

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Unit 12 delves into the critical examination of perfect competition equilibrium through the lenses of Nicholas Kaldor and Saraffa, offering a nuanced critique that challenges the traditional neoclassical perspective. Perfect competition, a cornerstone of economic theory, posits a market structure with numerous small firms producing homogeneous goods, characterized by perfect information, ease of

market entry and exit, and rational behaviour. Kaldor's critique scrutinizes this idealized equilibrium, arguing that real-world markets seldom align with these assumptions due to factors like imperfect information, market dynamics, and the inability of firms to consistently achieve optimal equilibrium states. Saraffa's theory further complicates this view by highlighting the inherent incompatibility of achieving stable equilibrium in perfect competition settings, emphasizing how market imperfections and evolving consumer preferences disrupt the theoretical equilibrium predictions. These critiques challenge economists to reconsider the assumptions underpinning perfect competition and explore more realistic models that account for the complexities of modern markets. Understanding Kaldor and Saraffa's perspectives is crucial for comprehending the limitations of traditional economic models and informing contemporary debates on market efficiency and regulatory policies.

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## **12.2 OBJECTIVES**

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Upon completing this unit, you should be able to:

1. Understand the concept of perfect competition equilibrium.
2. Analyze Nicholas Kaldor's critique of perfect competition.
3. Examine Saraffa's concept of incompatibility of equilibrium in perfect competition.
4. Evaluate the implications of these critiques on economic theory and policy.



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### 12.3 KEY CONCEPTS

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1. **Perfect Competition:** A market structure characterized by numerous small firms producing identical goods, perfect information among buyers and sellers, and ease of entry and exit into the market.
2. **Equilibrium:** A state in the market where the quantity demanded by consumers equals the quantity supplied by producers, resulting in market clearing without shortages or surpluses.
3. **Kaldor's Critique:** Challenges the assumptions of perfect competition by highlighting market imperfections such as imperfect information and the inability of firms to adjust instantly, questioning whether firms can achieve long-term equilibrium in real-world markets.
4. **Saraffa's Incompatibility:** Argues that perfect competition cannot achieve stable equilibrium due to ongoing changes in market conditions and imperfect information, which disrupt the theoretical conditions necessary for perfect competition.

These concepts form the foundation for understanding the critiques of perfect competition equilibrium by Kaldor and Saraffa, emphasizing the complexities and deviations from idealized market conditions in economic theory and practice.

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### 12.4 CHALLENGES TO PERFECT COMPETITION EQUILIBRIUM

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Perfect competition is an idealized market structure that serves as a benchmark in economic theory. It is characterized by a large number of small firms producing homogeneous products, free entry and exit from the market, perfect information, and no single firm having market power. The equilibrium in perfect competition is where the quantity demanded equals the quantity supplied at a particular price, resulting in optimal resource allocation and no persistent economic profits in the

long run. However, several challenges arise when applying this model to real-world markets, as highlighted by economists Nicholas Kaldor and Piero Sraffa.

## 1. Market Imperfections

**Imperfect Information:** One of the core assumptions of perfect competition is perfect information, where all buyers and sellers have completed and accurate information about prices, product quality, and market conditions. In reality, information asymmetry is prevalent. Consumers and producers often operate with incomplete or inaccurate information, leading to suboptimal decisions and market inefficiencies.

**Real-World Examples:** Consider the healthcare market, where patients often lack full information about treatment options, costs, and outcomes. This information gap can lead to inefficient choices and market outcomes that deviate from the idealized perfect competition scenario.

## 2. Dynamic Market Changes

**Technological Advancements:** Markets are not static; they are dynamic and continually influenced by technological advancements, changing consumer preferences, and evolving production techniques. These changes introduce variability and uncertainty, making it difficult for firms to maintain long-term equilibrium.

**Real-World Examples:** In the technology sector, rapid innovation can quickly render products obsolete, creating constant shifts in supply and demand that challenge the stability of market equilibrium.

### 3. Behavioral Realities

**Bounded Rationality:** Traditional economic models assume that all market participants are perfectly rational and have perfect foresight. However, real-world decision-making is often influenced by cognitive limitations, biases, and heuristic reasoning. This bounded rationality can lead to deviations from the predicted behaviors in perfect competition models.

**Real-World Examples:** In financial markets, investors often make decisions based on heuristics and biases rather than purely rational calculations, leading to market anomalies such as bubbles and crashes.

### 4. Inability to Achieve Long-Term Equilibrium

**Persistent Market Power:** Even in markets with many firms, some firms can achieve and maintain significant market power due to brand loyalty, economies of scale, or control over essential resources. This market power allows them to influence prices and output levels, deviating from the ideal of perfect competition.

**Real-World Examples:** The airline industry, where a few major players dominate the market, exemplifies how market power can persist despite the presence of multiple firms.

**Market Dynamics:** Kaldor and Sraffa argue that due to ongoing market dynamics and imperfect information, achieving and maintaining long-term equilibrium is unrealistic. Markets are constantly in flux, and the ideal conditions required for perfect competition rarely, if ever, exist in reality.

**Real-World Examples:** Agricultural markets often experience fluctuations in supply and demand due to weather conditions, changing

consumer preferences, and technological developments in farming techniques.

## 5. Policy Implications

**Need for Government Intervention:** Kaldor and Sraffa's critiques suggest that government intervention may be necessary to correct market failures. Policies such as antitrust regulations, consumer protection laws, and subsidies can help mitigate the effects of market imperfections and promote more competitive and efficient market outcomes.

**Real-World Examples:** Antitrust laws in various countries aim to prevent monopolies and promote competition, reflecting the need to address market power and ensure fair competition.

The critiques of perfect competition equilibrium by Kaldor and Sraffa underscore the complexities and imperfections inherent in real-world markets. These challenges highlight the limitations of traditional economic models and the necessity of considering market imperfections, dynamic changes, and behavioral realities when analyzing market behaviors and designing economic policies. By recognizing these challenges, economists and policymakers can develop more effective strategies to promote economic efficiency, innovation, and sustainable growth.

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## 12.5 NICHOLAS KALDOR'S CRITIQUE OF PERFECT COMPETITION

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Nicholas Kaldor's critique of perfect competition challenges the foundational assumptions of this theoretical market structure. Here are the key elements of Kaldor's critique:

1. **Market Imperfections:** Kaldor argues that real-world markets are characterized by imperfections such as imperfect information, where

buyers and sellers do not have complete knowledge of market conditions, prices, or product qualities. This contrasts sharply with the assumption of perfect information in the perfect competition model.

2. **Dynamic Market Changes:** In contrast to the static nature of perfect competition models, Kaldor emphasizes the dynamic nature of markets. Markets are subject to continuous changes in technology, consumer preferences, and costs, making it difficult for firms to achieve and maintain long-term equilibrium as assumed in perfect competition.
3. **Behavioral Realities:** Kaldor challenges the assumption of perfect rationality and perfect foresight among market participants. He argues that firms may not always make decisions in a perfectly rational manner and often lack complete information about future market conditions, leading to deviations from the competitive ideal.
4. **Inability to Achieve Equilibrium:** Due to these imperfections and dynamic changes, Kaldor suggests that firms in real-world markets may struggle to achieve the idealized equilibrium where quantity demanded equals quantity supplied at a given price. This casts doubt on the efficiency and stability of competitive markets as envisioned in traditional economic theory.
5. **Policy Implications:** Kaldor's critique has significant policy implications. It suggests that government intervention may be necessary to correct market failures caused by imperfect information and dynamic changes, thereby promoting economic efficiency and welfare.

Kaldor's critique provides a nuanced understanding of the limitations of perfect competition theory in capturing the complexities of real-world markets. It underscores the importance of considering market imperfections, dynamic changes, and behavioral realities when analyzing market outcomes and designing economic policies.

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## 12.6 SARAFFA'S INCOMPATIBILITY OF EQUILIBRIUM

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Saraffa's theory of incompatibility challenges the traditional notions of equilibrium within the framework of perfect competition, offering profound insights into the complexities of real-world market dynamics. This essay explores Saraffa's critique, its implications for economic theory and policy, and its relevance in understanding modern market behaviors.

### Understanding Saraffa's Incompatibility

Saraffa's theory posits that perfect competition cannot achieve stable equilibrium due to inherent market dynamics and imperfections in information. Unlike the idealized assumptions of perfect competition, which suggest that markets clear efficiently and continuously adjust to equilibrium states, Saraffa identifies several critical factors that disrupt this equilibrium:

1. **Market Dynamics:** Saraffa highlights the dynamic nature of markets, where technological advancements, changes in consumer preferences, and shifts in production techniques continually reshape economic activities. These dynamic changes introduce uncertainty and variability, making it challenging for firms to predict and adjust to market conditions accurately over time.
2. **Imperfect Information:** In contrast to the assumption of perfect information in traditional economic models, Saraffa emphasizes the reality of imperfect information among market participants. Firms and consumers often lack complete knowledge about prices, product qualities, and future market developments, leading to inefficiencies and deviations from theoretical market outcomes.
3. **Long-Run Equilibrium Concerns:** While perfect competition theory suggests that markets naturally tend towards long-run



equilibrium, where supply equals demand at a given price, Saraffa argues that achieving and maintaining this equilibrium is unrealistic. Factors such as imperfect foresight and the inability of firms to consistently adjust their production and pricing decisions prevent markets from reaching stable equilibrium states as envisioned in theoretical models.

### **Implications for Economic Theory and Policy**

Saraffa's critique has significant implications for economic theory and policy formulation:

**Market Efficiency:** By acknowledging the limitations of perfect competition in achieving equilibrium, Saraffa's theory challenges the notion that competitive markets always result in optimal resource allocation and efficiency. It prompts economists to consider alternative market structures and mechanisms that better reflect the complexities of real-world economic interactions.

**Regulatory Frameworks:** Saraffa's critique underscores the role of government intervention in correcting market failures caused by imperfect information and dynamic changes. Policies such as antitrust laws, consumer protection regulations, and subsidies may be necessary to promote competition, correct externalities, and ensure fair market outcomes.

**Behavioral Economics:** Saraffa's emphasis on imperfect information and bounded rationality aligns with insights from behavioral economics, which explores how psychological factors and cognitive biases influence economic decision-making. Integrating Saraffa's critique with behavioral economics enriches our understanding of market behaviors and decision outcomes beyond traditional rational choice models.

### **Real-World Applications**

To illustrate Saraffa's theory in practice, consider industries like technology and pharmaceuticals, where rapid innovation and uncertain consumer demand create challenges for firms in predicting market trends and adjusting production accordingly. In these sectors, imperfect



information about future technologies and consumer preferences often leads to market fluctuations and strategic uncertainties among competitors.

Saraffa's theory of incompatibility challenges economists and policymakers to rethink traditional assumptions about market equilibrium and perfect competition. By highlighting the limitations of these models in capturing real-world complexities, Saraffa enriches economic discourse with a more nuanced understanding of market dynamics and the role of government intervention. Embracing Saraffa's insights can lead to more effective policies that foster competition, innovation, and sustainable economic growth in contemporary markets.

### Check Your Progress

1. What are the basic assumptions of perfect competition?

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2. Explain Nicholas Kaldor's critique of perfect competition.

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## 12.7 CRITIQUE AND ANALYSIS

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This section delves into a critical evaluation of the critiques by Kaldor and Sraffa, comparing their perspectives with neoclassical economic theory, examining empirical evidence that supports or challenges their critiques, and discussing the policy implications for regulating markets and promoting economic efficiency.

### Comparison with Neoclassical Economic Theory

**Neoclassical Economic Theory:**

**Assumptions:** Neoclassical economics is built on assumptions of rational behavior, perfect information, and the ability of markets to self-regulate to reach equilibrium. It posits that in a perfectly competitive market, firms are price takers, and the market determines prices and output levels.

**Equilibrium:** The theory asserts that markets naturally gravitate towards equilibrium where supply equals demand, ensuring optimal resource allocation and maximum social welfare.

**Efficiency:** Perfect competition is considered the most efficient market structure, minimizing deadweight loss and maximizing consumer and producer surplus.

**Kaldor's Critique:**

**Imperfect Information:** Kaldor argues that the assumption of perfect information is unrealistic. In reality, market participants often operate with incomplete or asymmetrical information, leading to inefficiencies and suboptimal market outcomes.

**Dynamic Changes:** Kaldor highlights that markets are dynamic and constantly evolving due to technological advancements, changes in consumer preferences, and other external factors, which are not adequately captured by static neoclassical models.

**Behavioral Realities:** Kaldor points out that the assumption of rational behavior is flawed, as individuals often make decisions based on bounded rationality, influenced by cognitive biases and limited foresight.

### **Sraffa's Incompatibility:**

**Market Dynamics:** Sraffa emphasizes the constant flux in markets, arguing that achieving and maintaining long-term equilibrium is unrealistic due to continuous changes in technology, preferences, and external conditions.

**Long-Term Stability:** Sraffa challenges the notion that markets will naturally adjust to equilibrium in the long run, suggesting that persistent disequilibrium is a more accurate representation of real-world markets.

**Role of Market Power:** Sraffa also critiques the neoclassical view of market power, asserting that even in competitive markets, firms can maintain significant power due to factors like brand loyalty and economies of scale.

### **Empirical Evidence**

#### **Supporting Kaldor and Sraffa's Critiques:**

**Imperfect Information:** Numerous studies highlight the prevalence of information asymmetry in markets. For example, in the healthcare sector, patients often lack full information about treatment options and outcomes, leading to inefficiencies and higher costs.

**Dynamic Market Changes:** Empirical evidence from rapidly changing industries, such as technology, supports the notion that markets are dynamic and constantly evolving. Firms in these sectors face continual shifts in demand and supply conditions, challenging the static equilibrium model.

**Behavioral Economics:** Research in behavioral economics demonstrates that individuals frequently deviate from rational decision-making. Experiments and real-world data show that cognitive biases,

heuristics, and bounded rationality significantly impact economic behavior and market outcomes.

### **Challenging Kaldor and Sraffa's Critiques:**

**Instances of Stable Equilibrium:** There are markets where neoclassical predictions of equilibrium hold reasonably well, particularly in markets with well-defined products, low entry barriers, and high transparency. For example, commodity markets often exhibit characteristics close to perfect competition, with prices determined by supply and demand.

**Role of Competition:** In some markets, intense competition drives firms to improve efficiency and reduce costs, leading to outcomes that align with neoclassical predictions of optimal resource allocation.

### **Policy Implications**

#### **Regulating Markets:**

**Addressing Information Asymmetry:** Governments can implement policies to reduce information asymmetry, such as mandating transparency in pricing and product quality, enforcing truth-in-advertising laws, and providing public information campaigns.

**Promoting Competition:** Antitrust laws and regulations can prevent monopolistic practices and promote competitive markets. Policies that lower entry barriers, prevent collusion, and break up monopolies can help maintain competitive market structures.

#### **Promoting Economic Efficiency:**

**Government Intervention:** Kaldor and Sraffa's critiques suggest a role for government intervention in correcting market failures. This can include subsidies for research and development, public investment in

infrastructure, and policies that promote innovation and technological advancement.

**Behavioral Interventions:** Insights from behavioral economics can inform policies that nudge individuals towards more rational decision-making. Examples include default options for retirement savings plans, simplified information disclosures, and incentives for healthy behaviors.

### **Balancing Regulation and Market Forces:**

**Targeted Interventions:** Policymakers need to balance regulation with allowing market forces to operate efficiently. Overregulation can stifle innovation and competition, while under regulation can lead to market failures and inefficiencies.

**Dynamic Policies:** Given the dynamic nature of markets, policies should be adaptable and responsive to changing conditions. Continuous monitoring and evaluation of regulatory measures are essential to ensure they remain effective and relevant.

Kaldor and Sraffa's critiques of perfect competition equilibrium highlight significant challenges to the assumptions and predictions of neoclassical economic theory. Their insights into market imperfections, dynamic changes, and behavioral realities provide a more nuanced understanding of real-world markets. Empirical evidence supports many of their critiques, emphasizing the need for policies that address information asymmetry, promote competition, and correct market failures. By integrating these insights into economic theory and policy, we can develop more effective strategies for promoting economic efficiency, innovation, and sustainable growth.

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## 12.8 SUMMARY

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This unit critically examines the challenges to perfect competition equilibrium posed by Nicholas Kaldor and Saraffa. Kaldor's critique questions the feasibility of achieving ideal equilibrium in real-world markets, highlighting the limitations of perfect competition assumptions such as perfect information and instantaneous adjustments. He argues that market imperfections and dynamic changes prevent firms from consistently reaching optimal equilibrium states. Saraffa extends this critique by proposing that perfect competition inherently fails to achieve stable equilibrium due to ongoing market dynamics and imperfect information. Their theories collectively challenge the traditional neoclassical notion that perfect competition naturally leads to market efficiency and optimal outcomes. By exploring these critiques, the unit encourages a deeper understanding of how real markets operate and the implications for economic theory and policy. It underscores the need for more nuanced models that reflect the complexities of market behavior, informing discussions on regulatory frameworks and the pursuit of economic efficiency in contemporary economies.

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## 12.9 GLOSSARY

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- **Perfect Competition:** A market structure characterized by many small firms producing identical products, with perfect information, ease of entry and exit, and rational behavior.
- **Equilibrium:** A state in which quantity demanded equals quantity supplied, ensuring market clearing and no surpluses or shortages.
- **Kaldor's Critique:** Nicholas Kaldor's critique challenges the assumptions of perfect competition, questioning the feasibility of firms achieving long-term equilibrium due to market imperfections and dynamic changes.
- **Saraffa's Incompatibility:** Saraffa's theory posits that perfect competition cannot achieve stable equilibrium because of

ongoing market dynamics and imperfect information among market participants.

- **Market Imperfections:** Deviations from the ideal conditions of perfect competition, such as imperfect information, barriers to entry, and market power.
- **Dynamic Market Changes:** Fluctuations and adjustments in market conditions over time, influencing firm behavior and market outcomes.
- **Allocative Efficiency:** The allocation of resources that maximizes total welfare, where marginal cost equals marginal benefit.
- **Neoclassical Economics:** The traditional economic theory that emphasizes rational decision-making by individuals and firms, perfect competition, and equilibrium in markets.
- **Market Power:** The ability of a firm or group of firms to influence market prices and output levels, often leading to deviations from perfect competition outcomes.
- **Regulatory Frameworks:** Policies and laws implemented by governments to regulate market behavior, promote competition, and protect consumer interests.
- **Imperfect Information:** Situations where market participants do not have complete knowledge about prices, products, or market conditions.
- **Economic Efficiency:** The optimal allocation of resources that maximizes societal welfare, taking into account both allocative and productive efficiency.



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## 12.10 EXERCISES

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1. What are the key assumptions of perfect competition?

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2. Explain Nicholas Kaldor's critique of perfect competition.

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3. How does Saraffa's theory challenge the concept of equilibrium in perfect competition?

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4. Discuss the implications of Kaldor and Saraffa's critiques on economic policy.

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5. Provide examples of market dynamics that support the critiques of perfect competition.

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## 12.11 SUGGESTED READINGS

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1. Kaldor, N. (1934). *The Equilibrium of the Firm*. Economic Journal, 44(173), 60-76.
2. Saraffa, M. (1988). *Incompatibility of Equilibrium in Perfect Competition*. Journal of Economic Perspectives, 2(3), 165-178.
3. Baumol, W. J., & Blinder, A. S. (2015). *Microeconomics: Principles and Policy* (13th ed.). Cengage Learning.
4. Varian, H. R. (2014). *Intermediate Microeconomics: A Modern Approach* (9th ed.). Norton & Company.
5. Mankiw, N. G., & Taylor, M. P. (2014). *Economics* (3rd ed.). Cengage Learning.
6. Stigler, G. J. (1987). *The Theory of Price* (4th ed.). Macmillan Publishing Company.
7. Maskin, E., & Riley, J. G. (1989). *Optimal Auctions*. In *Handbook of Game Theory with Economic Applications*, Vol. 1, 289-333.
8. Carlton, D. W., & Perloff, J. M. (2005). *Modern Industrial Organization* (4th ed.). Addison-Wesley.
9. Martin, S. (2001). *Industrial Organization in Context*. Oxford University Press.
10. Tirole, J. (1988). *The Theory of Industrial Organization*. MIT Press.

## **BLOCK IV: MARKET STRUCTURES AND PRICING STRATEGIES**

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### **UNIT 13: MONOPOLY - PRICE AND OUTPUT DETERMINATION IN SHORT RUN AND LONG RUN**

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#### **STRUCTURE**

- 13.1 Introduction
- 13.2 Objectives
- 13.3 Monopoly
  - 13.3.1 Meaning and Concept of Monopoly
  - 13.3.2 Definitions of Monopoly
  - 13.3.3 Characteristics of Monopoly
  - 13.3.4 Factors leading to the establishment of a monopoly
- 13.4 Monopoly's Demand and Revenue Curves
  - 13.4.1 The interaction between AR & MR
  - 13.4.2 Price Elasticity under Monopoly
- 13.5 Summary
- 13.6 Glossary
- 13.7 Exercises
- 13.8 Suggested Readings

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#### **13.1 INTRODUCTION**

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The study of monopoly within microeconomics is pivotal to understanding market dynamics where a single firm dominates. Unlike competitive markets characterized by many sellers, a monopoly exists when a sole producer controls the entire market for a particular good or service, facing no close substitutes. This market structure allows the monopolist to wield significant market power, influencing both price and output levels. The monopolist's ability to set prices above marginal

cost, resulting in higher profits, fundamentally alters the market's supply-demand equilibrium. This unit delves into the mechanisms through which monopolies determine price and output in both the short run and the long run. In the short run, the monopolist maximizes profit by equating marginal revenue with marginal cost, resulting in a price that is higher and an output that is lower than in competitive markets. Over the long run, the monopolist adjusts its production processes and cost structures to sustain its market power and profitability. Understanding these dynamics is crucial as monopolies can lead to allocative and productive inefficiencies, creating deadweight loss and reducing overall consumer welfare. Regulatory interventions, such as antitrust laws and price controls, often aim to mitigate these inefficiencies. Through theoretical models and real-world examples, this unit explores the comprehensive economic implications of monopoly, providing insights into both the benefits and challenges of this unique market structure. The knowledge gained here is essential for analyzing how monopolistic practices impact consumers, competitors, and the overall economy, highlighting the importance of promoting competition to enhance market efficiency and consumer welfare.

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## **13.2 OBJECTIVES**

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By the end of this unit, you should be able to:

1. Understand the basic concept and characteristics of a monopoly.
2. Explain how a monopolist determines the price and output in the short run.
3. Analyze the factors influencing monopoly pricing and output decisions in the long run.
4. Compare and contrast the efficiency and welfare implications of monopoly with other market structures.
5. Evaluate the real-world examples of monopolies and their impact on consumers and the economy.

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## 13.3 MONOPOLY

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### 13.3.1 Meaning and Concept of Monopoly

The term "monopoly" is derived from the fusion of two words, namely "mono" and "poly". The term "mono" denotes a single entity, whereas "poly" pertains to the act of controlling many entities. Monopoly is a term used to describe a market condition when there is a sole vendor of a certain product.

The product produced by the monopolistic business has no viable alternatives, and there are obstacles preventing other firms from entering the market. The single producer might take the shape of a sole proprietor, a basic partnership, or a joint stock corporation. Put simply, with a monopoly, there is no distinction between a corporation and an industry.

A monopolist has complete authority over the supply of a product. By having control over the supply of the item, it is able to exert market power and determine the price. Therefore, a monopolist who is the only seller/producer might be likened to a ruler without a crown. In order for a monopoly to be effective, the cross elasticity of demand between the monopolist's product and any other seller's product must be minimal.

### 13.3.2 Definitions of Monopoly

**Bilas** “A pure monopoly refers to a market scenario where there is only one seller of a product and there are no other options available. This sole seller is neither influenced by, nor does it influence, the pricing and quantities of other items offered in the economy.”

**Koutsoyiannis** “Monopoly refers to a market condition characterised by the presence of just one vendor. The commodity it produces has no close replacements and there are obstacles preventing new competitors from entering the market.

“Under a full monopoly, there exists only one vendor in the market. The monopolist's demand represents the whole demand in the market. A monopolist has the power to set prices. A pure monopoly refers to a scenario when there are no alternatives available.” **A. J. Braff**

**Ferguson** “A pure monopoly occurs when there is a sole producer operating in the market. There are no formidable rivals. The user mentioned”

### **13.3.3 Characteristics of Monopoly**

**Single Seller:** In a monopoly, there is only one firm that produces and sells the product. This firm controls the entire market supply.

**Unique Product:** The product offered by the monopolist has no close substitutes, making it unique. Consumers have no alternatives, reinforcing the monopolist's market power.

**High Barriers to Entry:** Significant obstacles prevent other firms from entering the market. These barriers can be economic (high startup costs), legal (patents and licenses), or technological (proprietary technology).

**Price Maker:** The monopolist has the power to set the price of the product. Unlike firms in competitive markets that are price takers, the monopolist can influence the market price by adjusting the supply.

**Profit Maximization:** The monopolist aims to maximize profits by producing the quantity where marginal revenue equals marginal cost ( $MR = MC$ ). This leads to higher prices and lower quantities than in competitive markets.

**Inelastic Demand:** Due to the lack of close substitutes, the demand for the monopolist's product tends to be less elastic. Consumers are less sensitive to price changes, allowing the monopolist to maintain higher prices.

**Economies of Scale:** Monopolies often benefit from economies of scale, where the average cost of production decreases as output increases. This can further solidify the monopolist's market position by making it cost-prohibitive for new entrants.

**Non-Price Competition:** Monopolists may engage in non-price competition, such as advertising, product differentiation, and improved customer service, to maintain their market dominance and attract consumers.

**Lack of Consumer Choice:** Consumers face limited choices due to the absence of competing products. This can lead to reduced consumer welfare and satisfaction.

**Price Discrimination:** Monopolists may engage in price discrimination, charging different prices to different consumers based on their willingness to pay, thereby increasing their profits.

**Market Power:** The monopolist's control over the market allows it to wield significant market power, influencing not only prices but also production and distribution decisions.

**Regulatory Attention:** Due to potential abuses of market power, monopolies often attract regulatory scrutiny. Governments may implement antitrust laws and regulations to curb monopolistic practices and protect consumers.

**Limited Innovation:** Without competitive pressure, monopolies may have less incentive to innovate or improve their products and services, potentially leading to stagnation over time.

**Economic Profit:** Monopolists can sustain economic profits in the long run due to high barriers to entry and lack of competition, unlike firms in perfectly competitive markets that only make normal profits in the long run.

**Impact on Resource Allocation:** Monopolies can lead to inefficient resource allocation, as the monopolist's goal of profit maximization can result in underproduction relative to the socially optimal level of output. This misallocation can create deadweight loss in the economy.



#### 13.3.4 Factors leading to the establishment of a monopoly

1. **Natural Monopoly:** A monopoly may emerge due to the geographical concentration of specific natural resources. When essential resources are available only in certain regions, firms located there naturally gain exclusive control. For example, South Africa dominates the diamond industry, Canada is a major producer of nickel, and the Middle East holds a leading position in global oil production. These monopolies exist due to the natural abundance and limited geographical distribution of these resources.
2. **Technological Monopoly:** Technological superiority or ownership of specialized knowledge can give rise to monopoly power. A firm with exclusive access to advanced techniques, proprietary formulas, trade secrets, or essential production inputs can dominate a market. A well-known example is Coca-Cola, which holds unique formulas and production processes that are not easily replicable by competitors.
3. **Legal Monopoly:** Legal provisions such as patents, copyrights, and trademarks can grant monopoly rights to firms. These legal protections prevent others from producing or selling the same product for a certain period, allowing the original creator exclusive market control. Such monopolies are sanctioned by law to encourage innovation and creativity.
4. **High Capital Requirements:** Some industries require massive investments in infrastructure, machinery, or other capital resources. Due to the high costs involved, it becomes difficult for new firms to enter these sectors, resulting in limited competition and potential monopoly formation. Examples include heavy industries like steel manufacturing and large-scale transportation systems such as railways.

5. **State:** Government will possess exclusive authority over the production and sale of certain items. They own a monopoly on the market. As an example, in India, we possess public amenities such as electricity, trains, and water supply. Typically, the State manages these public utilities.

### Check Your Progress

1. What are the main characteristics of monopoly?  
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2. How does a monopolist determine price and output in the short run?  
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## 13.4 MONOPOLY'S DEMAND AND REVENUE CURVES

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It is essential to understand the nature of the demand curve a monopolist faces. In a perfectly competitive market, an individual firm encounters a horizontal demand curve, meaning it can sell any quantity of goods at the market price, which is fixed. However, the demand curve for the entire industry under perfect competition slopes downward because it reflects the behavior of all consumers and the inverse relationship between price and quantity demanded.

In the case of monopoly, the scenario changes significantly. A monopolist is the sole producer in the market and, therefore, faces the entire market demand curve. This curve is downward sloping since it represents the total demand from all consumers. Unlike a firm in perfect competition that can only decide on the quantity to produce while the

price remains constant, a monopolist must adjust the price when changing the quantity sold. This happens because increasing the quantity requires lowering the price to encourage additional purchases, and reducing the quantity allows for a higher price due to limited availability.

For example, consider a demand curve labeled DD (as illustrated in a hypothetical Figure 13.1). At a price level of OP, the monopolist can sell OM units. To sell more than OM, the firm must reduce the price. Conversely, to sell a smaller quantity, such as OG, the price must rise to OH. Every change in output affects the price, making the monopolist's pricing decisions more complex than in perfect competition.

The monopolist's average revenue (AR) curve coincides with the demand curve and thus slopes downward. As a result of this downward slope, the marginal revenue (MR) curve lies below the AR curve. This happens because the revenue gained from selling one more unit (MR) is less than the price charged, as lowering the price applies to all units sold. Therefore, the monopolist must carefully determine the optimal price-output combination to achieve maximum profit.

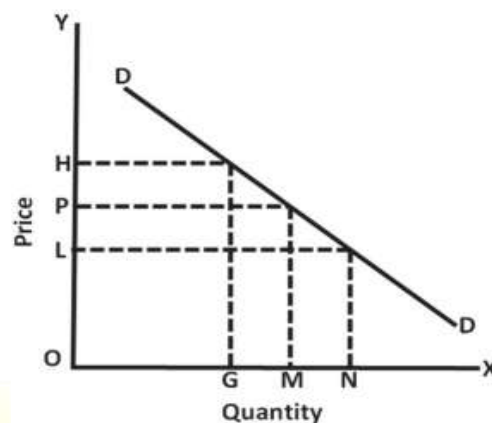


**Fig. 13.1: The Downward-Sloping Demand Curve of a Monopolist**

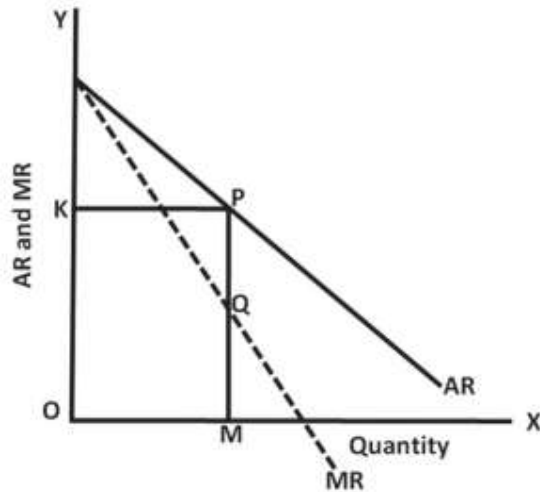


**Fig. 13.2 Behavior of Marginal and Average Revenue Curves in a Monopoly Market**

When a monopolist attempts to boost the quantity of goods sold, the product's price tends to fall. As a result, the additional revenue earned from selling one more unit—marginal revenue—will be less than the product's price. In Figure 13.2, the monopolist's average revenue (AR) curve is downward sloping. The marginal revenue (MR) curve, which indicates the change in total revenue from selling an extra unit, lies below the AR curve. For instance, at output level OM, the average revenue or price is represented by MP, while the marginal revenue is shown as MQ—clearly lower than MP. This relationship is further demonstrated with numerical data in Table 13.1.

Table 13.1 displays the calculation of the marginal rate (MR) based on the specified average rate (AR).

| Price P=AR | Quantity (q) | TR= P*Q | MR= $\Delta TR / \Delta q$ |
|------------|--------------|---------|----------------------------|
| 11         | 0            | 0       | -                          |
| 10         | 1            | 10      | 10                         |
| 9          | 2            | 18      | 8                          |
| 8          | 3            | 24      | 6                          |
| 7          | 4            | 28      | 4                          |
| 6          | 5            | 30      | 2                          |
| 5          | 6            | 30      | 0                          |
| 4          | 7            | 28      | -2                         |

### 13.3.1 Relationship between Average Revenue, Marginal Revenue and Price Elasticity under Monopoly

The connection between marginal revenue and average revenue at a specific output level is influenced by the price elasticity of demand. In this context, the relationship can be expressed using the following formula:

$$MR = AR \frac{(e-1)}{e}, \text{ where } e \text{ stands for price elasticity}$$

Since, AR is the same thing as price

$$\text{Therefore, } MR = \text{price} \frac{(e-1)}{e}$$

$$\text{or } \text{price} = MR \frac{e}{(e-1)}$$

Given that the expression  $(e-1)/e$  is less than one, it implies that marginal revenue (MR) is always lower than price (P), i.e., price exceeds marginal revenue. The relative position of the MR curve with respect to the average revenue (AR) curve depends on the value of the fraction  $(e-1)/e$ , where  $e$  is the price elasticity of demand.

In a monopoly, the monopolist faces a unique downward-sloping demand curve, which corresponds directly to the consumer demand for the product. Unlike firms in oligopoly or monopolistic competition, a

monopolist does not consider the effect of its price changes on rival firms because it operates without direct competition. Thus, changes in the monopolist's pricing do not trigger strategic responses from other firms.

For a monopoly to function effectively, the product must be significantly different or have no close substitutes. This distinction ensures that variations in price by the monopolist do not influence the pricing or output decisions of any potential competitors.

It's also crucial to understand that, except in the special case of constant elasticity (as seen when the demand function takes the form  $Q = aP - b$ , the price elasticity of demand varies at different points along a linear demand curve. Even if the slope remains constant, elasticity changes with price and quantity. This often leads to confusion between constant slope and constant elasticity two distinct concepts.

Consider a simple linear demand function:

$$Q = 20 - 0.5P.$$

One can compute elasticity at multiple points along this curve (e.g., points a, b, c, d, and e), and observe how elasticity shifts with changes in price and quantity.

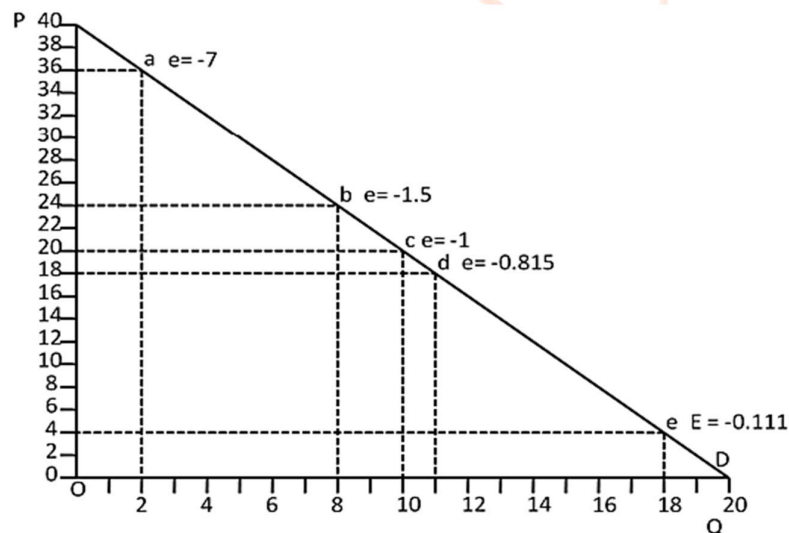


**Fig. 13.3 Price Elasticity of Demand along a Linear Demand Curve**

The elasticity may be computed at many places, namely a, b, c, d, and e.

The demand function is given by  $\Delta = -0.5$ . Therefore, the elasticity at various places may be calculated as  $e = \frac{\Delta}{P} \times -0.5$ .

At point A, the elasticity is calculated as 36 divided by 2, multiplied by -0.5, resulting in a value of -9.

The elasticity at position b is calculated as -1.5, using the formula  $\frac{24}{8} \times -0.5$ .

The elasticity at point c is calculated as  $\frac{20}{10} \times -0.5$ , resulting in a value of -1.

The elasticity at position d is calculated to be -0.818, which is obtained by multiplying  $\frac{18}{11}$  by -0.5. The elasticity at point e is calculated as  $\frac{4}{18}$  multiplied by -0.5, resulting in a value of -0.111.

Observe that at point c, which is the midway of the curve, the elasticity is -1. This indicates that the curve is unit elastic. The curve above point C exhibits elastic behaviour. The elasticity increases as the price level rises and the quantity decreases. When the price is 40 and the quantity is 0, the elasticity will be infinite. Below point c, the curve exhibits inelasticity and becomes more inelastic as the price decreases and the quantity increases. When the price is 0 and the quantity is 20, the elasticity will be 0.

Now, let us analyse this situation from the perspective of marginal income.

$$MR = \frac{d(TR)}{dQ} \text{ and } TR = PQ \text{ so } MR = \frac{d(PQ)}{dQ}.$$

The inverse demand function is shown here.

$$P=40-2Q \text{ so, } PQ=40Q-2Q^2 \text{ and } \frac{d(PQ)}{dQ} = 40-4Q.$$



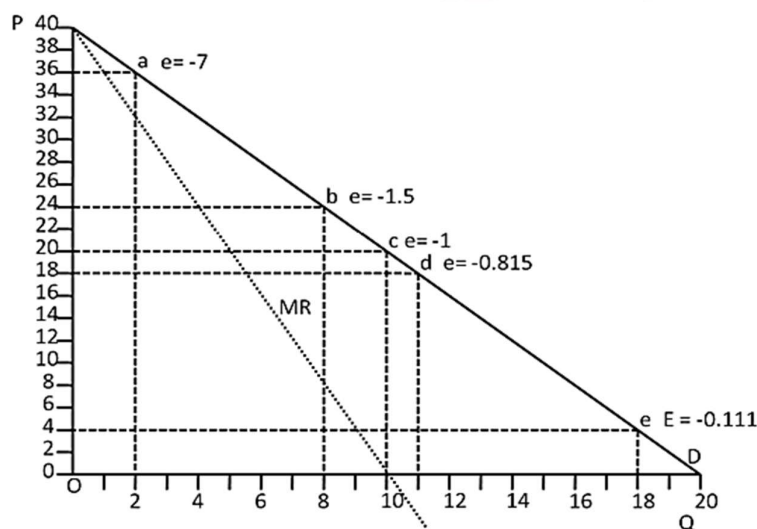


**Fig.13.4 the relationship between price elasticity of demand and marginal revenue along a linear demand curve.**

It shows that marginal revenue remains positive when the demand is elastic, becomes zero at the point of unit elasticity, and turns negative when the demand becomes inelastic. Since marginal revenue represents the extra earnings from selling an additional unit, a negative marginal revenue implies a loss on the extra unit sold, making further sales unprofitable.

Alternatively, one might approach this from an algebraic perspective.

Considering the fact that  $MR = \frac{d(PQ)}{dQ}$ , Alternatively, one may consider this issue from an algebraic standpoint. Given the circumstance that  $\frac{d(PQ)}{dQ} = P \frac{dQ}{dQ} + Q \frac{dP}{dQ}$  so  $MR = P + Q \frac{dP}{dQ}$

Now, do multiplication on both the numerator and denominator of the right-hand side of

the equation by P, resulting in  $MR = P + PQ \frac{dP}{PdQ}$ . We may extract the common component,

P, from this expression to get  $MR = P \left[ 1 + Q \frac{dP}{PdQ} \right]$  It may be restated with minimal variations as  $MR = P \left[ 1 + \frac{Q}{P} \frac{dP}{dQ} \right]$ .

The expression on the right-hand side of the equation represents the inverse of the price elasticity of demand,  $1/e$ . Therefore, marginal revenue (MR) can be written as  $MR = P[1 + 1/e]$ , a handy formula to keep in mind.

Elastic demand exists when the price elasticity is less than -1, while inelastic demand lies between -1 and 0. A monopolist avoids producing in the inelastic portion of the demand curve because, in this range,  $[1 + 1/e]$  becomes negative. Since price (P) is always positive, multiplying it by a negative value results in negative marginal revenue. No rational firm would increase output if doing so leads to a loss.

$$MR = 10 - 2Q$$

$$TC = 3 + Q + 0.5Q^2$$

$$MC = 1 = Q$$

Monopolist will produce where,

$$MR = MC$$

$$10 - 2Q = 1 + Q$$

$$3Q = 9$$

$$Q = 3$$

Quantity are sold at price given by

$$P = 10 - Q$$

$$= 10 - 3$$

$$\therefore P = \$7$$

Monopolist profit (Rupees) is given by:

$$\text{Profit} = TR - TC$$

$$= [7 \times 3] - [3 + 3 + 0.5 \times 3^3]$$

$$= 21 - [6 + 9/2] = [21 - 21/2] = 10.5$$

$$\text{Profit} = \$10.5$$

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## 13.5 SUMMARY

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Monopoly, as a market structure, presents a unique set of characteristics and challenges. A monopolist determines price and output by equating marginal revenue with marginal cost, resulting in higher prices and restricted output compared to competitive markets. While monopolies can achieve long-term profits due to high entry barriers, they also lead to inefficiencies and welfare losses. Understanding the mechanisms of monopoly helps in analyzing real-world examples and the impact of regulatory policies aimed at curbing monopolistic power. By studying monopolies, we gain insights into the broader implications of market power and the importance of promoting competitive practices for economic welfare.

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## 13.6 GLOSSARY

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- **Monopoly:** A market form where a single seller dominates the supply of a particular good or service.
- **Price Maker:** A firm that possesses the ability to set or influence the price of its product, rather than accepting a market-determined price.
- **Marginal Revenue (MR):** The extra income a firm receives from selling one more unit of its output.
- **Marginal Cost (MC):** The additional cost incurred in producing one extra unit of a good.
- **Total Revenue (TR):** The overall earnings from sales, obtained by multiplying the selling price by the quantity sold.
- **Average Total Cost (ATC):** The cost per unit of output, calculated by dividing total cost by the number of units produced.
- **Economic Profit:** The surplus a firm earns after subtracting both explicit and implicit costs from total revenue.

- **Deadweight Loss:** The loss in economic efficiency that can occur when equilibrium for a good or service is not achieved or is not achievable.
- **Allocative Efficiency:** A condition where resources are allocated in a manner that maximizes societal welfare, typically where price equals marginal cost.
- **Productive Efficiency:** Achieved when goods are produced at the minimum average cost, utilizing resources fully and effectively.
- **Natural Monopoly:** A market situation where a single firm can supply the entire market demand at a lower cost than multiple competing firms, often due to high fixed costs.
- **Antitrust Laws:** Legal frameworks designed to prevent anti-competitive practices and encourage fair competition.
- **Price Regulation:** Government-imposed limits or controls on the prices set by firms, particularly monopolies, to protect consumer interests.
- **Long-Run Marginal Cost (LRMC):** The additional cost of producing one more unit when all inputs can be varied in the long run.
- **Consumer Surplus:** The benefit consumers receive when they pay less for a product than what they are willing to pay.

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## 13.7 EXERCISES

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1. What are the key characteristics of a monopoly?

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2. How does a monopolist determine the price and output in the short run?

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3. Explain the concept of deadweight loss in a monopolistic market.

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4. What are the long-run adjustments a monopolist can make?

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5. Discuss the regulatory implications for monopolies and their impact on market efficiency.

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## 13.8 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2020). *Microeconomics* (9th ed.). Pearson.
2. Carlton, D. W., & Perloff, J. M. (2015). *Modern Industrial Organization* (4th ed.). Pearson.
3. Tirole, J. (1988). *The Theory of Industrial Organization*. MIT Press.
4. Church, J., & Ware, R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill.
5. Journal of Economic Literature: Contains numerous articles on monopolies and market power.
6. <https://egyankosh.ac.in/bitstream/123456789/67487/1/Unit-10.pdf>

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## **UNIT 14: MONOPOLY POWER, PRICE DISCRIMINATION, AND DUMPING**

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### **STRUCTURE**

- 14.1 Introduction
- 14.2 Objectives
- 14.3 Monopoly Power
- 14.4 Price Discrimination
  - 14.3.1 First-Degree Price Discrimination
  - 14.3.2 Second-Degree Price Discrimination
  - 14.3.4 Third-Degree Price Discrimination
- 14.5 Dumping
  - 14.5.1 Meaning and Concept
  - 14.5.2 Types of Dumping
- 14.6 Welfare Implications of Price Discrimination and Dumping
- 14.7 Regulation of Price Discrimination and Dumping
- 14.8 Summary
- 14.9 Glossary
- 14.10 Exercises
- 14.11 Suggested Readings

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### **14.1 INTRODUCTION**

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In this unit, we delve into the concepts of monopoly power, price discrimination, and dumping. Monopoly power is the ability of a single firm to influence market prices and output levels due to the absence of competition. This power stems from high barriers to entry, control over essential resources, and legal protections like patents. We will examine the different types of price discrimination first-degree, second-degree, and third-degree and the conditions under which they are implemented. First-degree price discrimination occurs when a seller charges each buyer their highest willingness to pay, thereby converting all consumer surplus into profit. Second-degree price discrimination involves setting varying prices depending on the quantity purchased or the version of the



product, such as offering discounts for bulk purchases. Third-degree price discrimination charges different prices to different groups based on identifiable characteristics such as age, location, or purchase time. Additionally, we will explore dumping, where firms sell products at lower prices in foreign markets than in domestic markets. This practice can be used to gain market share, dispose of surplus production, or engage in predatory pricing. The welfare implications of these practices include potential benefits to consumers in the form of lower prices and increased market efficiency but also significant downsides such as reduced competition, higher prices for some consumer groups, and market distortions. We will also discuss regulatory measures to control these practices, such as antitrust laws, price controls, and anti-dumping duties, which aim to promote fair competition and protect consumers and domestic industries. This comprehensive examination will provide a deeper understanding of how monopoly power, price discrimination, and dumping impact markets and the economy.

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## **14.2 OBJECTIVES**

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After studying this unit, you should be able to:

1. Understand the concept of monopoly power.
2. Explain the different forms of price discrimination and the conditions necessary for their effective implementation.
3. Examine the concept of dumping and its effects on the economy.
4. Evaluate the impact of price discrimination and dumping on consumer welfare and market efficiency.
5. Outline the regulatory frameworks designed to manage and prevent price discrimination and dumping.

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## **14.3 MONOPOLY POWER**

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In the context of economics, a monopoly refers to a market situation where there is only one seller, known as a monopolist, who controls the

production and distribution of a certain commodity. The monopolist exercises authority over pricing, demand, and supply determinations, so establishing prices in a manner that maximizes profit. The monopolist often employs price discrimination by charging varying prices to different customers for the same commodity. The act of charging varying prices for the same product is referred to as price discrimination.

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## 14.4 PRICE DISCRIMINATION

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**According to Robinson**, price discrimination refers to the strategy of charging different prices for the same product or applying the same price to products that have been slightly differentiated.

### Types of Price Discrimination

Price discrimination is a common pricing strategy adopted by monopolists who possess the power to set prices independently. It is often employed to gain a competitive advantage or to strengthen their position within the market.

There are three distinct forms of pricing discrimination, which are delineated below:

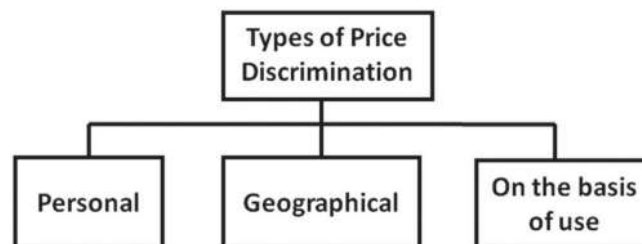


**Fig.14.1 Types of pricing discrimination**

#### i) Individual

Personal price discrimination occurs when varying prices are applied to different persons. Prices vary based on customers' economic levels

and their desire to buy a thing. For instance, a physician imposes varying costs on patients based on their socioeconomic status.

**ii) Location-Based Price Discrimination**

This occurs when a monopolist charges different prices for the same product in different geographic regions. Such pricing remains effective when buyers paying the lower price are unable to resell the product to those in higher-priced areas.

**iii) Usage-Based Price Discrimination**

In this type, the price varies depending on how the product or service is used. For instance, utility companies may charge lower rates for residential electricity and higher ones for commercial use. A specific form of this is peak-load pricing, where prices differ according to the time of day, reflecting varying demand levels.

**Levels of Price Discrimination**

**i) First-degree Price Discrimination:**

This occurs when a monopolist charges each consumer the highest price, they are willing to pay, maximizing revenue by capturing the entire consumer surplus. This practice is sometimes referred to as perfect price discrimination, since it entails the utmost exploitation of customers. Under this form of price discrimination, customers do not experience any consumer surplus. The practice of law and medicine requires a first degree.

**ii) Second-Degree Price Discrimination**

This pricing approach involves charging different prices based on the quantity purchased or the version of the product chosen, reflecting the buyer's willingness to pay. It typically applies when buyers self-select into pricing tiers—for example, in the case of railways or airlines offering different classes or bulk pricing.

### iii) Third-Degree Price Discrimination

This method involves dividing the market into distinct segments and setting separate prices for each group. It's also known as market segmentation. Here, the monopolist ensures that goods sold in one segment cannot be resold in another. Determining the price elasticity of demand in each segment is essential. Market segmentation is often based on factors like age, gender, or region.

For example, senior citizens may receive discounted train fares, and students often pay reduced rates at cinemas, museums, or heritage sites. Figure 14.1 illustrates this concept with three segments labeled (a), (b), and (c).

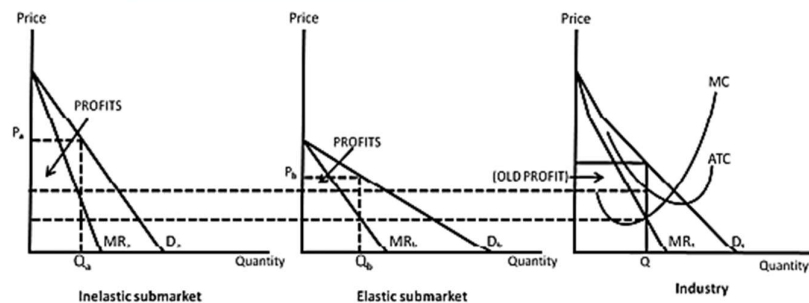


**Fig.- 14.2 Price Discrimination Across Submarkets and Industry Equilibrium**

Segments (a) and (b) illustrate markets with demand curves that are relatively unresponsive to changes in price (inelastic) and markets with demand curves that are highly responsive to changes in price (elastic), respectively. The horizontal sum of the AR and MR curves of segments (a) and (b) is given as AR<sub>t</sub> and MR<sub>t</sub>, respectively. The company has a solitary Average Total Cost curve and its related Marginal Cost Curve. The intersection of the marginal cost (MC) and marginal revenue (MR) curves determines the equilibrium output (OQ) for the company. Additionally, it displays the marginal revenue (MR) for the company, which is the level that maximises its earnings. The company aims to

achieve equal marginal revenue from every unit sold in either of the two market categories. The locations  $E_a$  and  $E_b$ , where the extended line EM intersects with  $MR_a$  and  $MR_b$  respectively, will be used to establish the equilibrium outputs  $Q_a$  and  $Q_b$  for the two market sectors. Prices are set based on how much consumers are willing to pay for different quantities, represented as  $P_a$  and  $P_b$ .

**Two key factors are noteworthy:** A monopolist supplies larger quantities in markets where demand is relatively elastic, and smaller quantities where demand is less responsive or inelastic.

We see that  $Q_b$  is greater than  $Q_a$ . Nevertheless, the price increase in segment (a) with inelastic demand,  $P_a$ , exceeds the price in segment (b),  $P_b$ . Buyers with inelastic demand are at a significant disadvantage when dealing with a monopolist. They are forced to purchase fewer amounts and are subjected to higher pricing.

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## 14.5 DUMPING

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### 14.5.1 Meaning and Concept

Dumping is a controversial practice in international trade where a firm sells a product in a foreign market at a price lower than its domestic price or below its cost of production. This tactic is employed for various strategic reasons, primarily to gain market share in a foreign market or to dispose of surplus production that cannot be sold domestically. While dumping can offer short-term benefits to consumers in the form of lower prices, it often has adverse long-term effects on market competition and domestic industries in the importing country. Understanding the nuances of dumping requires examining its different types, the motivations behind it, and its economic implications.

### 14.5.2 Types of Dumping

**1. Predatory Dumping:** Predatory dumping is a strategic maneuver where a firm deliberately lowers prices in a foreign market to drive out

local competitors. Once the competition has been weakened or eliminated, the firm can raise prices and establish a dominant position in the market. This type of dumping is particularly harmful as it can lead to monopolistic or oligopolistic market structures, reducing consumer welfare in the long term despite initial low prices.

**2. Persistent Dumping:** Persistent dumping occurs when a firm continuously sells its products at lower prices in foreign markets compared to domestic markets. This type of dumping is often a result of differences in demand elasticity between markets. In foreign markets, where demand is more price-sensitive, the firm reduces prices to increase sales volume. Persistent dumping can be sustained over long periods, often reflecting the firm's strategy to maximize overall profits by exploiting different market conditions.

**3. Sporadic Dumping:** Sporadic dumping happens when a firm temporarily reduces prices in a foreign market to sell off excess inventory or avoid a downturn in the domestic market. This type of dumping is less strategic and more opportunistic, aimed at managing inventory levels or responding to temporary changes in market conditions. While sporadic dumping is typically short-term, it can still disrupt foreign markets and harm local producers.

### **Motivations Behind Dumping**

The motivations for dumping can be varied, ranging from strategic market entry to tactical responses to market conditions. One of the primary motivations is to gain a foothold in a foreign market. By offering products at lower prices, a firm can attract customers away from local competitors, increasing its market share. This can be particularly effective in markets where consumers are highly price-sensitive.

Another motivation is to manage surplus production. In industries with high fixed costs or seasonal demand fluctuations, firms may produce more than the domestic market can absorb. Dumping excess products in foreign markets allows firms to maintain production levels and avoid the costs associated with reducing output or storing surplus goods.



Firms may also engage in dumping to exploit differences in demand elasticity between markets. In markets where demand is more elastic, consumers are more responsive to price changes. By lowering prices in such markets, firms can increase sales volumes and enhance overall profitability.

### **Economic Implications of Dumping**

The economic implications of dumping are complex and multifaceted. On one hand, consumers in the importing country benefit from lower prices, which can increase consumer surplus and improve standards of living. However, the long-term effects are often detrimental to the overall market and domestic industries.

**Impact on Domestic Industries:** Dumping can severely harm domestic producers in the importing country. By undercutting local prices, foreign firms can drive domestic competitors out of business, leading to job losses and reduced industrial capacity. This can create a dependency on foreign imports, weakening the economic resilience of the importing country.

**Market Distortions:** Dumping can lead to market distortions by creating an artificial competitive advantage for foreign firms. This disrupts the normal functioning of the market, where prices should reflect the cost of production and market demand. Over time, this can lead to inefficient allocation of resources and reduced innovation and productivity in domestic industries.

**Retaliatory Measures:** Dumping often triggers retaliatory trade measures from affected countries. Governments may impose anti-dumping duties or tariffs to protect domestic industries, leading to trade disputes and potential escalation into broader trade conflicts. These measures can increase the cost of goods, reduce trade volumes, and strain international trade relations.

### **Regulatory Measures to Control Dumping**

To mitigate the negative effects of dumping, governments and international bodies have developed various regulatory measures. Anti-



dumping duties are one of the primary tools used to counteract dumping. These duties are tariffs imposed on imported goods that are found to be priced below fair market value. By raising the price of dumped goods, anti-dumping duties aim to level the playing field for domestic producers.

Trade agreements and international trade organizations, such as the World Trade Organization (WTO), also play a crucial role in regulating dumping practices. The WTO provides a framework for member countries to address dumping through established legal mechanisms. Countries can file complaints and seek resolution through the WTO's dispute settlement process, ensuring that anti-dumping measures are consistent with international trade rules.

Governments may also implement policies to support domestic industries affected by dumping. This can include financial assistance, subsidies, or measures to enhance competitiveness and innovation. By strengthening domestic industries, governments can reduce their vulnerability to dumping and promote sustainable economic growth.

Dumping is a significant issue in international trade, with far-reaching economic implications. While it can provide short-term benefits to consumers in the form of lower prices, the long-term effects are often detrimental to domestic industries and market competition. Understanding the different types of dumping, the motivations behind it, and its economic impact is crucial.

### Check Your Progress

1. What is monopoly power? How does it arise?

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2. What is price discrimination? Explain its different types.

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## 14.6 WELFARE IMPLICATIONS OF PRICE DISCRIMINATION AND DUMPING

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### Welfare Implications of Price Discrimination

Price discrimination can have varied impacts on welfare, depending on the type and extent of the practice. Here, we discuss the effects on consumer welfare, producer welfare, and overall economic welfare.

#### 1. Consumer Welfare:

**Positive Impacts:** In some cases, price discrimination can make products affordable to consumers who might otherwise be unable to purchase them. For example, third-degree price discrimination, such as student discounts, can benefit specific consumer groups.

**Negative Impacts:** Conversely, price discrimination can lead to higher prices for some consumers. First-degree price discrimination captures all consumer surplus, resulting in consumers paying the maximum they are willing to pay, which does not benefit consumers at all.

#### 2. Producer Welfare:

**Positive Impacts:** Firms can significantly increase their profits through price discrimination. By charging higher prices to those willing to pay more and lower prices to others, firms can capture a larger portion of consumer surplus. This can lead to increased revenue and profitability, especially in markets with varied demand elasticities.

**Negative Impacts:** While beneficial for individual firms, extensive price discrimination can attract regulatory scrutiny and potential backlash from consumers, potentially leading to long-term reputation damage.

#### 3. Overall Welfare:

**Allocative Efficiency:** First-degree price discrimination can theoretically lead to allocative efficiency, where each consumer is

charged exactly their willingness to pay, maximizing total surplus. However, this is rare in practice due to the difficulty of perfectly segmenting the market.

**Deadweight Loss:** Second- and third-degree price discrimination may lead to deadweight losses, where not all mutually beneficial trades are made. For instance, some consumers may be priced out of the market, resulting in a loss of total welfare.

### **Welfare Implications of Dumping**

Dumping has significant welfare implications, particularly for consumers and producers in both the dumping and importing countries. These implications can be short-term or long-term and vary based on the nature and duration of the dumping practices.

#### **4. Consumer Welfare:**

**Positive Impacts:** In the short term, consumers in the foreign market benefit from lower prices due to dumping. This makes goods more affordable, increasing consumer surplus and accessibility to products.

**Negative Impacts:** If dumping leads to the elimination of local competitors, the dumping firm may later raise prices, reducing consumer welfare. The initial low prices can be a strategy to monopolize the market, ultimately harming consumers through higher prices and less choice.

#### **5. Producer Welfare:**

**Negative Impacts for Domestic Producers:** Domestic producers in the foreign market often suffer due to dumping. They face unfair competition from firms selling below cost, which can erode their market share and profits. Persistent or predatory dumping can lead to business closures and job losses in the domestic industry.

**Potential Positive Impacts for Dumping Firms:** Firms that engage in dumping can benefit by quickly expanding their market share and disposing of surplus production. This can lead to higher overall sales volumes and economies of scale.

### 1. Overall Welfare:

**Market Distortions:** Dumping can cause significant market distortions by driving efficient local producers out of business, leading to a less competitive market environment. Once competition is reduced, the dumping firm may exploit its dominant position, reducing overall market efficiency.

**Retaliatory Trade Measures:** Dumping often triggers retaliatory measures, such as anti-dumping duties and tariffs, which can escalate into trade conflicts. These measures aim to protect domestic industries but can lead to higher prices for consumers and strained international trade relations.

**Long-Term Economic Impact:** The long-term impact of dumping includes potential harm to the domestic industry's innovation and investment capabilities. Constant exposure to unfair competition can discourage domestic firms from investing in new technologies and expanding production capacities, negatively affecting the broader economy.

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## 14.7 REGULATION OF PRICE DISCRIMINATION AND DUMPING

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### Regulation of Price Discrimination

Price discrimination, while potentially beneficial to firms, can raise concerns about fairness, market efficiency, and consumer welfare. Regulation aims to mitigate these concerns and ensure competitive markets.

### Antitrust Laws:

Antitrust laws prohibit monopolistic practices that harm competition and consumers. They may be used to challenge price discrimination that leads to market power or consumer harm.

Governments enforce antitrust laws to prevent firms from unfairly manipulating prices or exploiting market power gained through price discrimination.

**Price Controls:**

In some industries, governments impose price controls to limit the extent of price discrimination and ensure fair pricing. These controls may cap the maximum price that can be charged or set guidelines for pricing strategies.

**Consumer Protection Regulations:**

Consumer protection agencies monitor pricing practices to ensure that price discrimination does not unfairly disadvantage certain consumer groups.

Regulations may require transparency in pricing strategies or prohibit discriminatory pricing that discriminates against protected classes.

**International Trade Agreements:**

Some international trade agreements include provisions to regulate price discrimination practices. These agreements aim to promote fair competition and prevent anti-competitive behaviors that can distort international trade.

**Regulation of Dumping**

Dumping practices are regulated to protect domestic industries from unfair competition and maintain market stability.

**Anti-Dumping Duties:**

Governments may impose anti-dumping duties, also known as tariffs, on imported goods that are sold at prices below fair market value. These duties aim to level the playing field for domestic producers by offsetting the price advantage gained through dumping.

Anti-dumping duties are calculated based on the price difference between the export price and the fair market value determined through investigations.

**Trade Remedies:**

Countries may use trade remedies, such as safeguard measures, to protect domestic industries from sudden surges in imports resulting from dumping. These measures provide temporary relief to affected industries while longer-term solutions are sought.

**WTO Rules and Dispute Settlement Mechanisms:**

The World Trade Organization (WTO) sets rules governing international trade, including regulations on dumping. WTO members can file disputes and seek resolution through WTO's dispute settlement mechanisms to address alleged cases of dumping.

**National Legislation:**

Many countries have national legislation that specifically addresses dumping practices and provides guidelines for determining when anti-dumping measures are warranted.

These regulations typically necessitate comprehensive investigations and concrete evidence of significant harm to domestic industries before anti-dumping duties can be enforced. Governing price discrimination and dumping is essential for fostering fair competition, safeguarding consumer interests, and ensuring market stability. Effective oversight involves striking a balance between encouraging innovation and efficiency while curbing anti-competitive practices that may disadvantage consumers and local industries. Through the enforcement of antitrust laws, the application of price controls, and the imposition of anti-dumping duties, governments aim to establish a competitive marketplace where businesses succeed based on merit rather than unfair pricing strategies. Additionally, international trade agreements and World Trade Organization (WTO) regulations further reinforce this framework, promoting equity and consistency in global trade.



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## 14.8 SUMMARY

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This unit explored the intricacies of monopoly power, price discrimination, and dumping. In markets with limited competition, firms with monopoly power can control prices and output, often leading to various forms of price discrimination. We examined three types: first-degree, where each consumer is charged their maximum willingness to pay; second-degree, which adjusts prices based on quantity or product variations; and third-degree, where different consumer groups are charged varying prices based on identifiable factors. Additionally, we analyzed dumping, a strategy where firms sell goods in foreign markets at lower prices than in domestic markets. This approach is often used to expand market presence, clear excess inventory, or engage in aggressive pricing tactics, carrying significant economic implications. While lower prices can benefit consumers, these practices may reduce market competition and lead to future price increases. Dumping, in particular, can destabilize domestic industries and provoke trade retaliation. To address these concerns, we explored regulatory mechanisms such as antitrust laws, price controls, and anti-dumping duties designed to maintain fair competition and protect consumers. This discussion offered a thorough understanding of how these strategies shape market behavior and economic welfare.

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## 14.9 GLOSSARY

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- **Monopoly Power:** The ability of a firm to influence market prices due to lack of competition.
- **Price Discrimination:** Charging different prices to different consumers for the same product based on their willingness to pay.
- **First-Degree Price Discrimination:** Charging each consumer the maximum price they are willing to pay.



- **Second-Degree Price Discrimination:** Charging different prices based on quantity consumed or product version.
- **Third-Degree Price Discrimination:** Charging different prices to different groups of consumers based on identifiable characteristics.
- **Dumping:** The practice of offering a product in an international market at a price lower than its domestic price or below its production cost.
- **Anti-Dumping Duties:** Tariffs imposed on imported goods priced below fair market value to protect domestic industries.

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## 14.10 EXERCISES

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1. What is monopoly power and how does it arise?  
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2. Explain the concept of price discrimination and its different types.  
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3. Describe the practice of dumping and its economic implications.  
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4. Discuss the welfare implications of price discrimination.

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5. What regulatory measures can be taken to control dumping practices?

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### 14.11 SUGGESTED READINGS

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1. Besanko, D., Dranove, D., Shanley, M., & Schaefer, S. (2013). Economics of Strategy. Wiley.
2. Salvatore, D. (2015). Managerial Economics in a Global Economy. Oxford University Press.
3. Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach (9th ed.). Norton & Company.
4. Motta, M. (2004). Competition Policy: Theory and Practice. Cambridge University Press.
5. Tirole, J. (1988). The Theory of Industrial Organization. MIT Press.
6. <https://egyankosh.ac.in/bitstream/123456789/67487/1/Unit-10.pdf>
7. Stigler, G. J. (1987). The Theory of Price (4th ed.). Macmillan Publishing Company.
8. Maskin, E., & Riley, J. G. (1989). Optimal Auctions. In Handbook of Game Theory with Economic Applications, Vol. 1, 289-333.
9. Carlton, D. W., & Perloff, J. M. (2005). Modern Industrial Organization (4th ed.). Addison-Wesley.

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## **UNIT 15: MONOPSONY AND BILATERAL MONOPOLY**

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### **STRUCTURE**

- 15.1 Introduction
- 15.2 Objectives
- 15.3 Monopsony
  - 15.3.1 Meaning and Concept
  - 15.3.2 Features of Monopsony
  - 15.3.3 Equilibrium in a monopsony market system
  - 15.3.4 Advantages and Disadvantages of Monopsony
- 15.4 Bilateral Monopoly
  - 15.4.1 Meaning and Concept
  - 15.4.2 Characteristics of Bilateral Monopoly
  - 15.4.3 The Mechanisms of a Bilateral Monopoly
- 15.5 Merits and Demerits of Bilateral Monopoly
- 15.6 Summary
- 15.7 Glossary
- 15.8 Exercises
- 15.9 Suggested Readings

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### **15.1 INTRODUCTION**

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In microeconomics, the exploration of market structures extends beyond the familiar realms of perfect competition and monopoly to encompass the distinctive and influential forms of monopsony and bilateral monopoly. Unit 15 delves into these unique market configurations, providing a comprehensive understanding of their characteristics, dynamics, and economic implications. A monopsony arises when there is a single dominant buyer in a market, which wields significant power over suppliers and can influence prices and terms of purchase. This scenario is particularly prevalent in labor markets where one large employer dictates wages and employment conditions, impacting

workers and the broader economy. Conversely, a bilateral monopoly occurs when a market is characterized by a single seller (monopolist) and a single buyer (monopsonist), creating a situation where the negotiating power is concentrated in both parties. This interplay results in unique pricing and output outcomes that differ from more competitive markets. Real-world examples of bilateral monopolies include labor unions negotiating with a sole employer or exclusive supply agreements in specialized industries. Understanding these market forms is crucial for analyzing the full spectrum of economic interactions and power imbalances, offering insights into how they affect pricing, resource allocation, and overall market efficiency. By examining the theoretical foundations and practical manifestations of monopsony and bilateral monopoly, this unit aims to equip students with a nuanced perspective on the complexities of market dynamics and the implications for economic welfare and policy.

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## 15.2 OBJECTIVES

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After studying this unit, you will be able to:

1. Identify and describe the key features of monopsony and bilateral monopoly market structures.
2. Differentiate between monopsony and monopoly, and between bilateral monopoly and other market forms.
3. Examine how monopsony power affects pricing, wages, and the allocation of resources.
4. Analyze the welfare effects of monopsony and bilateral monopoly on consumers, producers, and overall market efficiency.
5. Discuss potential market failures and inefficiencies arising from these market structures.

6. Understand the role of government policies and regulations in addressing the negative impacts of monopsony and bilateral monopoly.
7. Evaluate different policy approaches to mitigate market power and promote fair competition.

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## 15.3 MONOPSONY

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### 15.3.1 Meaning and Concept:

Monopsony is a market structure that was first conceptualized by Joan Robinson in 1933 in her book, "The Economics of Imperfect Competition." She was honored as a classics scholar at the University of Cambridge for her significant contribution. Monopsony is a market system characterised by the presence of a single buyer and several sellers who are in competition with each other. This market power allows the buyer to acquire the product at a price lower than the prevailing price in the competitive market.

Monopsony is a market structure characterized by the presence of a single buyer with substantial market power, dominating the purchase of a particular good or service. The term "monopsony" is derived from the Greek words ' "monos" meaning "single" and "opsōnia" meaning "purchase." In a monopsonistic market, the single buyer controls the demand side, which allows them to influence the price and quantity of the goods or services they purchase.

### 15.3.2 Features of Monopsony

1. **Single Buyer Dominance:** A monopsony is characterized by the presence of a single buyer who has significant control over the market, influencing the prices and terms of purchase for goods or services.
2. **Market Power:** The monopsonist wields considerable market power, allowing them to drive prices down. This power is

typically much greater than in competitive markets where multiple buyers exist.

3. **Price Maker:** Unlike in a competitive market where prices are determined by supply and demand, the monopsonist sets the price. This often leads to lower prices than those found in competitive markets.
4. **Reduced Wages:** In labor markets, a monopsonist employer can set wages below the competitive equilibrium level, resulting in lower pay for workers and potentially poorer working conditions.
  - **Barrier to Entry:** The monopsonist's dominance creates significant barriers to entry for other potential buyers. This lack of competition helps maintain their market power and influence.
5. **Supplier Dependence:** Suppliers in a monopsony market often depend heavily on the single buyer. This dependence can make suppliers vulnerable to the monopsonist's purchasing decisions and price-setting.
6. **Suboptimal Resource Allocation:** The monopsonist's power can lead to an inefficient allocation of resources. By setting lower prices, the monopsonist may discourage suppliers from investing in quality improvements or innovation.
7. **Reduced Quantity Purchased:** To maximize their own benefit, the monopsonist may purchase a smaller quantity of goods or services than would be bought in a competitive market, leading to underproduction.
8. **Economic Inefficiency:** The monopsonist's practices can create deadweight loss in the market. This inefficiency arises because the monopsonist's price-setting leads to a loss of potential economic welfare.
9. **Strategic Behavior:** The monopsonist may engage in strategic behavior to maintain or enhance their market

power, such as negotiating long-term contracts that further entrench their position.

10. **Potential for Exploitation:** The monopsonist has the potential to exploit suppliers or workers by imposing unfavorable terms. This exploitation can lead to lower quality of life for workers or lower sustainability for suppliers.
11. **Government and Regulatory Scrutiny:** Monopsonistic markets often attract attention from regulators and policymakers, who may intervene to prevent abuse of market power and ensure fairer practices.
12. **Lack of Alternative Markets:** Suppliers or employees have few or no alternative buyers or employers, limiting their options and reducing their negotiating power.
13. **Impact on Supply Chain:** The monopsonist's influence extends throughout the supply chain, affecting the terms and conditions under which upstream suppliers operate.
14. **Consumer Impact:** While consumers may benefit from lower prices in the short term, the long-term effects of reduced innovation and investment by suppliers can lead to lower overall quality and variety of products available.

A monopsony is defined by the presence of a single dominant buyer who exerts significant control over the market, affecting prices, wages, and overall market dynamics. The monopsonist's ability to influence terms of trade can lead to both benefits and drawbacks, making the study of monopsony crucial for understanding various economic outcomes and policy implications.

### **15.3.3 Equilibrium in a monopsony market system**

To determine equilibrium in a monopsony market system, we must consider two concepts: average spending and marginal expenditure. In a state of equilibrium, the monopsony occurs when the marginal value is equal to the marginal expenditure. To comprehend the concepts of



average spending and marginal expenditure, we use the notion of a competitive buyer. Within the market system, we have seen that the marginal principle rule is used to determine the quantity of an item to be purchased. According to the marginal principle rule, the marginal income is equivalent to the marginal cost, meaning that the extra benefit is equal to the increased expense. The demand curve quantifies the marginal value of a product based on the amount bought. In a competitive market, individual buyers are very insignificant in terms of the whole market and hence lack the ability to have any impact on the market. Each individual customer has no impact on the price of the goods, and each consumer may purchase whatever quantity they like at the price fixed by the industry. The cost per unit purchased by the customer is equivalent to the price of the product. The average expenditure refers to the price per unit paid by the buyer. The average expenditure is constant for all units as the price per unit paid by the customer is uniform. However, marginal expenditure refers to the increase in overall spending that occurs when one additional unit of an item is purchased. In a competitive market, the average spending is equivalent to the marginal expenditure. Both lines are parallel to the horizontal axis. However, this does not hold true for a monopolist.

In a monopoly, the price paid by the buyer for each unit bought is determined by the supply curve of the inputs in the market. The supply curve for most inputs has a positive slope, meaning it slopes upward. The upward sloping supply curve demonstrates a direct correlation between price and quantity bought. The curve represents the relationship between the price per unit that customers are willing to pay for an item and the quantity of units they acquire. The supply curve represents the average spending curve. The average spending curve, similar to the market supply curve, has an increasing slope. The marginal expenditure must be lower than the average expenditure curve because purchasing an additional unit increases the price that must be paid for all units, not just the additional one.

Marginal expenditure may be derived algebraically. The supply curve illustrates the correlation between the price of a product or service and the amount that producers are willing and able to provide. Algebraic methods may be used to calculate marginal expense. The supply curve illustrates the correlation between the price of a product or service and the amount that producers are willing to provide. Therefore,

$$P = f(Q)$$

The total expense is calculated by multiplying the price by the amount, that is,

$$E = P \times Q$$

Marginal expenditure refers to the increase in overall cost that occurs when one more unit of an item is purchased.

$$ME = \frac{\Delta T.E}{\Delta Q} = P(Q) + Q \cdot \frac{\Delta P}{\Delta Q}$$

The favorably sloping supply curve implies that there is a positive relationship between changes in price ( $\Delta P$ ) and changes in quantity ( $\Delta Q$ ). Consequently, the marginal expenditure (ME) is larger than the average expenditure (AE) ( $ME > AE$ ). In the context of a monopsonist, equilibrium occurs when the marginal value is equal to the marginal expenditure.

The figure illustrates this. The X-axis represents price, whereas the Y-axis represents quantity. The average expenditure curve is represented by AE, the marginal expenditure curve is represented by ME, and the demand curve that displays the marginal value is represented by MV. The equilibrium is reached at point E, where the marginal value curve crosses the marginal expenditure curve. The price at equilibrium is denoted as  $OP^*$ , whereas the quantity at equilibrium is represented as  $OQ^*$ . The monopsonist is purchasing the optimum amount, denoted as  $OQ^*$ , at the price  $OP^*$ . In a monopsony market, the prevailing quantity and price are lower compared to what would exist in a competitive market.

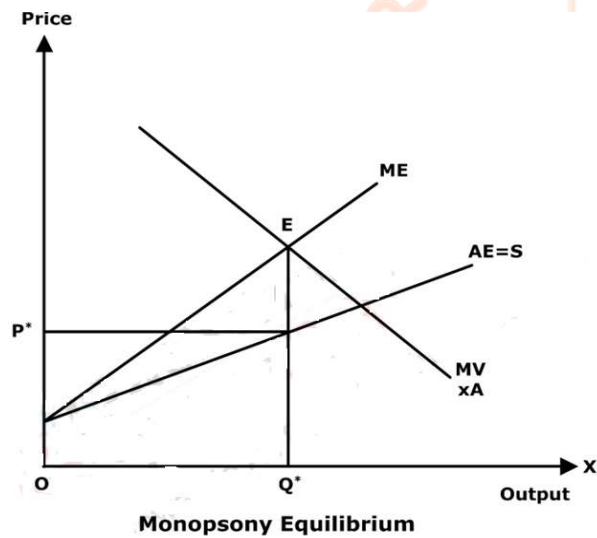


**Figure 15.1 Monopsony Equilibrium**

Figure 15.1 The monopsonist reaches equilibrium when the marginal value is equal to the marginal expenditure. The point of equilibrium, denoted as E, is characterised by the equilibrium price,  $OP^*$ , and the equilibrium quantity,  $OQ^*$ .

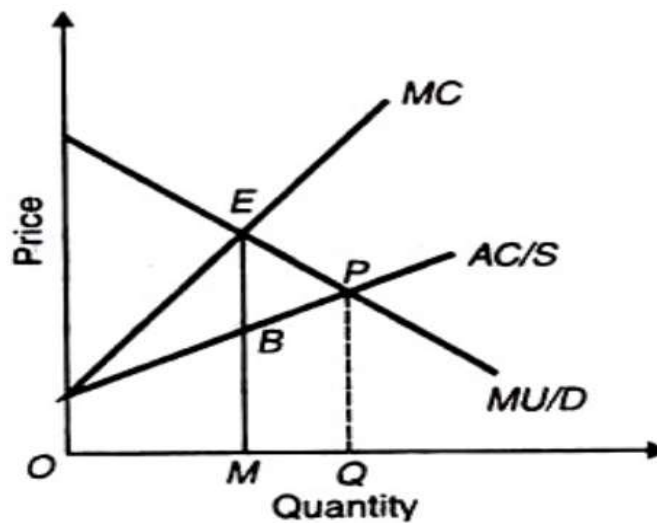


**Fig.15.2 Monopsony Equilibrium: Marginal Value and Marginal Expenditure**

### 15.3.4 Advantages and Disadvantages of Monopsony Advantages

#### 1. Lower Prices for the Buyer

- **Cost Savings:** A monopsonist can leverage their market power to negotiate lower prices from suppliers or employees, leading to significant cost savings.
- **Economies of Scale:** The large volume of purchases can lead to economies of scale, reducing the per-unit cost of goods and services.

#### 2. Increased Efficiency

- **Streamlined Supply Chain:** With control over the purchasing process, a monopsonist can streamline their supply chain operations, reduce inefficiencies and enhance coordination.
- **Improved Bargaining Position:** The monopsonist's strong bargaining position can lead to better terms and conditions, such as longer payment periods or higher quality standards from suppliers.

#### 3. Stability and Predictability

- **Consistent Demand:** Suppliers or employees working with a monopsonist often benefit from a steady and predictable demand for their goods or labor, leading to more stable income and business operations.
- **Long-Term Contracts:** Monopsonists often enter into long-term contracts with suppliers or employees, providing a stable and predictable business environment.

#### 4. Potential for Social Benefits

- **Wage Regulation:** In some cases, a monopsonist might use their power to set higher minimum wages or better working conditions, particularly in industries where labor standards are typically low.

## Disadvantages

### 1. Market Distortion

- **Lower Prices for Suppliers:** The monopsonist's ability to drive prices down can lead to lower revenues for suppliers, which may impact their profitability and sustainability.
- **Reduced Wages:** In labor markets, monopsony power often results in lower wages and poorer working conditions for employees, as the employer sets wages below competitive levels.

### 2. Inefficiency and Underproduction

- **Suboptimal Output:** The monopsonist may purchase less than the socially optimal quantity of goods or labor, leading to underproduction and inefficiencies in the market.
- **Resource Misallocation:** The pressure to reduce prices can lead to a misallocation of resources, as suppliers may cut corners or reduce investment in quality and innovation.

### 3. Barriers to Entry

- **Reduced Competition:** The monopsonist's dominance can create significant barriers to entry for other buyers, stifling competition and leading to a less dynamic market environment.
- **Supplier Dependence:** Suppliers or employees become heavily dependent on the monopsonist, reducing their ability to negotiate or seek alternative markets.

### 4. Negative Social Impact

- **Worker Exploitation:** In extreme cases, monopsonists may exploit their workers by paying them significantly below the competitive wage, leading to poor living standards and social discontent.

- **Economic Disparity:** When a single buyer holds dominant market power, it can deepen economic inequality, as the cost savings are often not shared with employees or consumers.

#### 5. Potential for Monopolistic Practices

- **Market Manipulation:** The monopsonist may engage in practices that manipulate the market to their advantage, such as imposing unfair terms on suppliers or engaging in anti-competitive behavior.
- **Regulatory Challenges:** Monopsonies often attract regulatory scrutiny and legal challenges, leading to potential conflicts with antitrust laws and other regulations aimed at promoting fair competition.

While monopsonies can lead to cost savings and increased efficiency for the buyer, they also pose significant risks to suppliers, employees, and overall market health. The disadvantages often outweigh the advantages, as monopsonistic practices can lead to market distortions, inefficiencies, and negative social impacts. Effective regulation and policy intervention are crucial to mitigate the adverse effects of monopsony power and ensure a fair and competitive market environment.

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## 15.4 BILATERAL MONOPOLY

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### 15.4.1 Meaning and Concept

Economists often use the term "bilateral monopoly systems" to refer to the labour markets of industrialized countries throughout the 1800s and early 20th century. Major corporations would effectively establish a monopoly over all employment opportunities within a particular community and use their influence to suppress salaries to lower levels. In order to enhance their capacity to negotiate, workers established labour unions, which granted them the authority to engage in strikes, so enabling them to become an equitable entity in pay negotiations.



With the ongoing success of capitalism in the United States and other countries, there was an boost in the number of enterprises vying for the labour force. Consequently, the ability of a single company to determine salaries significantly diminished. Consequently, the proportion of employees who belong to a labour union has declined, while the majority of emerging businesses have developed without the need of worker collectives for negotiating.

### **Features of Bilateral Monopoly**

1. **Single Seller and Single Buyer:** A bilateral monopoly involves one seller (monopolist) and one buyer (monopsonist) in the market.
2. **Negotiation Dynamics:** The equilibrium price and quantity are determined by the bargaining process between the monopolist and monopsonist, rather than market forces.
3. **Market Power Balance:** Both the seller and buyer have significant market power, leading to unique pricing and output outcomes based on their relative bargaining strengths.
4. **Uncertain Results:** The ultimate price and output levels are not fixed and are influenced by the nature of the bargaining process, potentially leading to a range of different outcomes.
5. **Strategic Interactions:** Both parties engage in strategic behavior to maximize their respective profits, influencing the final market equilibrium.
6. **Potential for Efficiency:** The negotiated outcomes can sometimes be more efficient than those in a monopsony or monopoly alone, but they can also result in inefficiencies.
7. **Regulation and Policy Influence:** Government intervention, such as antitrust laws and regulations, can play a crucial role in moderating the power dynamics and promoting fair competition.

### **The Mechanisms of a Bilateral Monopoly**

Bilateral monopoly necessitates the supplier and the customer, who possess completely contrasting interests, to attain an equilibrium of their



interests. The purchaser aims to acquire goods at a low cost, while the vendor strives to offer them at a high price. In order for both parties to achieve success in a company, it is crucial to establish a harmonious alignment of interests that is exemplified by a mutually beneficial "win-win" framework. Simultaneously, both the vendor and the buyer possess a clear understanding of the identity of the party they are transacting with.

Bilateral monopoly refers to a market system in which there are two monopolies, one controlling the demand side and the other controlling the supply side. It occurs when a market has only one seller, known as a monopolist, and only one buyer, known as a monopsonist. Both buyers and sellers are in a position of negotiation, making it difficult to anticipate the price and production. Here, we are making the assumption that enterprises are structured in a manner that resembles a monopsony, where they have significant control over the labour market. Additionally, we assume that labour is organized in a labour union that operates similarly to a monopolist, exerting substantial influence over the supply of labour.

It is understood that a monopoly does not have a supply curve. It suggests that there is no singular correlation between price and amount offered. A monopolist is optimizing its profit by choosing a certain point on its buyer's demand function. However, the monopsonist does not have an input demand function. A monopsonist maximizes its profit by choosing a certain point on the supply function of its sellers.

In the context of bilateral monopoly, the market power of both the buyer (monopsony power) and the seller (monopoly power) offset each other. The sellers' monopolistic power will diminish the buyers' effective monopsony power, and vice versa.

The monopolist is unable to take use of a demand function that is nonexistent, and the monopsonist is unable to exploit an input demand

function that does not exist. The three potential resolutions under bilateral monopoly are:

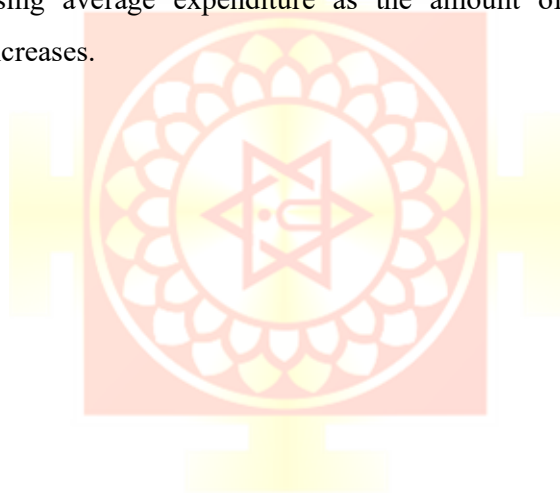
1. The monopsonist and monopolist may collaborate and reach a Nash equilibrium.
2. The monopolist has the power to control and compel the monopsonist to accept their pricing and production choices, or vice versa.
3. The market mechanism may fail to function, resulting in a complete absence of commerce.

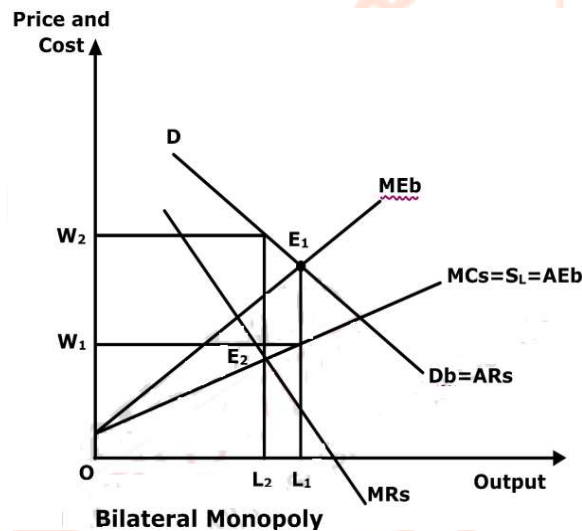
We will elucidate the concept of bilateral monopoly by using a figure. The graphic depicts a graph where the horizontal axis represents the output, while the vertical axis represents the price and cost.

The  $DD_b$  represents the demand curve that is encountered by a monopsonist, which is determined by their marginal utility curve. Since there is only one buyer for the commodity in the market, the demand curve  $DD_b$  would represent the average revenue curve of the monopolist. Therefore, we represent the  $DD_b$  curve as the  $AR_s$ , which stands for the average revenue of the seller. The monopolist's marginal revenue curve, denoted as  $MR$ , corresponds to the demand curve  $DD_b$ . The labour supply curve encountered by the monopsonist has a positive slope. The curve  $S_L$  demonstrates this.

The supply curve represents the average spending curve that the monopsonist encounters.

The marginal expenditure curve,  $ME_b$ , is positioned above  $AE_b$  due to the increasing average expenditure as the amount of the product obtained increases.





This Figure shows that the equilibrium in a bilateral monopoly is indeterminate. The bilateral monopoly model only provides the upper and lower bounds within which the wage rate will fall.

In the first scenario, the monopsonist assumes full market power to set price and output to maximize profit. This involves equating marginal expenditure to the marginal value indicated by the demand curve  $DDb$ . The monopsonist's equilibrium occurs at point  $E_1$ , where the marginal expenditure curve  $MEb$  intersects the demand curve  $DDb$ , resulting in an equilibrium price of  $Ow_1$  and an equilibrium quantity of  $OL_1$ . Here, the monopsonist maximizes profit by optimally purchasing  $OL_1$  at the price  $Ow_1$ .

Conversely, in the second scenario, the monopolist assumes full market power to set price and output for profit maximization. The monopolist achieves this by equating marginal revenue with marginal cost, reaching equilibrium at point  $E_2$ , where these two curves intersect. The monopolist's equilibrium price is  $Ow_2$ , with an equilibrium quantity of  $OL_2$ , indicating that the monopolist maximizes profit by selling  $OL_2$  at the price  $Ow_2$ . From the figure, it is evident that the monopolist's preferred price  $Ow_2$  is higher than the monopsonist's preferred price  $Ow_1$  (i.e.,  $Ow_2 > Ow_1$ ).

When both the monopolist and monopsonist act as sole price setters independently, the result is divergent prices and quantities. The bilateral monopoly model only establishes the upper limit ( $Ow_2$ , the monopolist's price) and the lower limit ( $Ow_1$ , the monopsonist's price) for the wage rate, which is ultimately determined through bargaining. The exact outcome of this bargaining process is uncertain. The final price can fall anywhere between the two limits,  $Ow_1$  and  $Ow_2$ , indicating that the solution to a bilateral monopoly is indeterminate.

### Check Your Progress

1. What is monopsony? State its main characteristics.

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2. What is a bilateral monopoly? How is it different from a monopsony?

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## 15.5 MERITS AND DEMERITS OF BILATERAL MONOPOLY

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### Advantages

1. **Potential for Efficiency**

- **Negotiated Equilibrium:** The negotiation process can sometimes lead to a mutually beneficial equilibrium that balances the interests of both the monopolist and the monopsonist, potentially resulting in efficient resource allocation.
- **Stable Contracts:** Long-term agreements between the single buyer and seller can provide stability and

predictability in supply and pricing, which can be beneficial for both parties in planning and operations.

## 2. Market Power Balance

- **Countervailing Power:** The presence of significant power on both sides can prevent either party from exploiting the other excessively. This balance can lead to fairer prices and terms than in markets where power is unbalanced.
- **Incentive for Collaboration:** Both parties have a vested interest in maintaining a functional relationship, which can lead to collaboration and innovation to improve efficiency and reduce costs.

## 3. Focused Negotiations

- **Direct Bargaining:** The direct negotiations between the single buyer and seller can lead to more tailored and precise agreements that reflect the specific needs and capabilities of both parties.
- **Flexibility:** The terms of trade can be adjusted more flexibly to accommodate changing market conditions and individual circumstances, leading to potentially better outcomes than rigid market structures.

## Disadvantages

### 1. Indeterminate Outcomes

- **Uncertain Results:** The final price and quantity in a bilateral monopoly are not determined by market forces but by negotiation, which can lead to indeterminate and potentially volatile outcomes.
- **Bargaining Power Imbalance:** If one party has significantly more bargaining power, the negotiation can result in terms that heavily favor one side, leading to potential inefficiencies and unfair distribution of surplus.

## 2. Potential for Inefficiency

- **Suboptimal Allocation:** The negotiated outcomes may not always align with the socially optimal allocation of resources, leading to potential deadweight losses.
- **Strategic Behavior:** Both parties might engage in strategic behavior that prioritizes their individual gains over overall market efficiency, such as withholding supply or demand to influence terms.

## 3. Risk of Collusion

- **Market Manipulation:** The close relationship between the single buyer and seller can sometimes lead to collusive behavior, where both parties agree to set prices or terms that are unfavorable to consumers or other market participants.
- **Regulatory Scrutiny:** Such markets may attract regulatory attention and intervention to prevent anti-competitive practices, leading to increased legal and compliance costs.

## 4. Limited Competition

- **Barrier to Entry:** The existence of a bilateral monopoly can create significant barriers to entry for other buyers and sellers, reducing overall market competition.
- **Innovation Stifling:** The lack of competition can lead to complacency and reduce the incentives for innovation and improvement in products, services, and processes.

## 5. Dependence and Vulnerability

- **Mutual Dependence:** Both the monopolist and the monopsonist become highly dependent on each other, which can be risky if one party faces financial difficulties or changes in strategy.
- **Vulnerability to Negotiation Failures:** If negotiations fail or become contentious, it can lead to supply disruptions, price instability, and potential losses for both parties.

While bilateral monopolies can offer potential benefits such as balanced power dynamics and stable contractual relationships, they also pose significant risks related to indeterminate outcomes, potential inefficiencies, and reduced market competition. The advantages and disadvantages highlight the need for careful management and, in some cases, regulatory oversight to ensure that the market operates fairly and efficiently for all stakeholders.

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## 15.6 SUMMARY

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Unit 15: Monopsony and Bilateral Monopoly offers an in-depth exploration of these unique and influential market structures, highlighting their distinct characteristics and economic implications. A monopsony, characterized by a single dominant buyer, significantly influences prices and terms of purchase, particularly evident in labor markets where large employers dictate wages and employment conditions. This contrasts with a monopoly, where a single seller dominates. Conversely, a bilateral monopoly features a market with both a single seller (monopolist) and a single buyer (monopsonist), creating a dynamic interplay of negotiating power that leads to unique pricing and output outcomes. The unit examines real-world examples, such as labor unions negotiating with sole employers and exclusive supply agreements in specialized industries, to illustrate these concepts. By analyzing the market power exerted by monopsonists and the negotiating dynamics in bilateral monopolies, students gain a comprehensive understanding of the welfare implications for consumers, producers, and overall market efficiency. The unit also explores potential market failures and inefficiencies, highlighting the importance of government policies and regulations in mitigating



negative impacts and promoting fair competition. Through this detailed examination, students are equipped with a nuanced perspective on the complexities of monopsony and bilateral monopoly, enhancing their ability to analyze and address issues related to market power and economic welfare

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## 15.7 GLOSSARY

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- **Monopsony:** A market structure in which there is only one buyer, giving the buyer significant power over the prices and terms of purchase.
- **Bilateral Monopoly:** A market structure characterized by a single seller (monopolist) and a single buyer (monopsonist), resulting in unique negotiation dynamics and pricing outcomes.
- **Market Power:** The ability of a firm or buyer to influence the price and terms of exchange in a market due to lack of competition.
- **Wage Determination:** The process by which wages are set, significantly influenced by monopsony power in labor markets.
- **Negotiation Dynamics:** The strategic interactions between a buyer and a seller in a bilateral monopoly, impacting prices and output.
- **Economic Welfare:** The overall well-being and economic efficiency of consumers and producers in a market, affected by market structures like monopsony and bilateral monopoly.
- **Resource Allocation:** The distribution of resources among different uses and users, influenced by the power dynamics in monopsony and bilateral monopoly markets.
- **Market Efficiency:** The extent to which market outcomes maximize total surplus (consumer and producer surplus), often reduced in monopsony and bilateral monopoly situations.
- **Price Setting:** The determination of prices by the dominant player in a market, such as a monopsonist or monopolist.

- **Labor Market:** A market in which workers seek employment and employers seek workers, often subject to monopsony power when a single employer dominates.
- **Exclusive Supply Agreement:** A contractual arrangement where a seller agrees to sell only to a single buyer, often creating a bilateral monopoly.
- **Monopolist:** A single seller in a market with significant control over prices and supply of a good or service.
- **Bargaining Power:** The relative ability of a buyer or seller to influence the terms of a transaction, especially significant in bilateral monopolies.
- **Antitrust Laws:** Regulations designed to promote competition and prevent monopolistic and monopsonistic practices that harm economic welfare.
- **Market Failure:** A situation where the allocation of goods and services by a market is not efficient, often occurring in monopsony and bilateral monopoly due to power imbalances.

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## 15.8 EXERCISES

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1. Explain the concept of monopsony. How does a monopsony differ from a monopoly in terms of market power and pricing strategy?  
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2. What are the welfare implications of monopsony power in labor markets? Discuss with real-world examples.  
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3. Define bilateral monopoly and describe the negotiation dynamics that occur between the monopolist and the monopsonist.

4. How do exclusive supply agreements contribute to the formation of bilateral monopolies? Provide examples from specific industries.

5. What role do antitrust laws play in regulating monopsony and bilateral monopoly market structures? Discuss the potential challenges in enforcing these regulations.

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## 15.9 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2020). *Microeconomics* (9th ed.). Pearson. This comprehensive textbook covers various market structures, including monopsony and bilateral monopoly.
2. Woodward, J. (2005). *Industrial organization: Theory and practice*. Pearson. This book provides an in-depth analysis of market power and its implications.
3. Carlton, D. W., & Perloff, J. M. (2015). *Modern industrial organization* (4th ed.). Pearson. This book offers detailed discussions on different market forms and their economic effects.
4. Tirole, J. (1988). *The theory of industrial organization*. MIT Press. This key text covers the economic theories underpinning market structures like monopsony and bilateral monopoly.
5. [https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp\\_content/S000011EC/P000642/M010591/ET/1452493986ECO\\_P3\\_M29\\_E-text.pdf](https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000011EC/P000642/M010591/ET/1452493986ECO_P3_M29_E-text.pdf)
6. <https://www.investopedia.com/terms/b/bilateralmonopoly.asp>



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## **UNIT 16: MONOPOLISTIC COMPETITION- PRICING AND MARKETING**

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### **STRUCTURE**

- 16.1 Introduction
- 16.2 Objectives
- 16.3 Monopolistic Competition
  - 16.3.1 Meaning and Concept
  - 16.3.2 Characteristics
- 16.4 Pricing Strategies in Monopolistic Competition
- 16.5 Equilibrium in Monopolistic Competition
- 16.6 Summary
- 16.7 Glossary
- 16.8 Exercises
- 16.9 Suggested Readings

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### **16.1 INTRODUCTION**

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Monopolistic competition represents a prevalent market structure where many firms offer products that are differentiated from one another yet serve similar purposes. This differentiation can stem from various factors, including branding, quality, features, and customer service, leading to a unique market dynamic distinct from pure competition or monopoly. Unlike in perfect competition, firms in monopolistic competition have some degree of market power, allowing them to influence prices to an extent. However, this power is limited by the availability of close substitutes. The pricing strategies in such a market are crucial, as firms must balance between maximizing profits and staying competitive. Short-run pricing often focuses on covering costs and achieving immediate profitability, while long-run pricing strategies are more concerned with sustaining market position and responding to competitive pressures. The role of demand elasticity is significant in this context, as it dictates how price changes affect consumer demand and

overall revenue. Marketing techniques are equally important in monopolistic competition, as firms invest heavily in advertising and promotion to differentiate their products and build brand loyalty. Effective marketing can enhance a firm's perceived value, attract new customers, and retain existing ones. Product differentiation is at the heart of monopolistic competition, allowing firms to carve out niche markets and command higher prices. Innovations and technological advancements often drive differentiation, giving firms a competitive edge. However, this market structure also poses challenges related to economic efficiency and welfare, as the quest for differentiation can lead to increased costs and potentially higher prices for consumers. Despite these challenges, monopolistic competition fosters a dynamic market environment where consumer choice and product variety thrive. Understanding the intricacies of pricing and marketing within this framework is essential for businesses aiming to navigate and succeed in a competitive landscape where differentiation and strategic positioning are key.

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## **16.2 OBJECTIVES**

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After studying this unit, you will be able to:

1. Understand the fundamental characteristics of monopolistic competition.
2. Explain the pricing strategies employed by firms in a monopolistically competitive market.
3. Analyze the role of non-price competition and marketing in monopolistic competition.
4. Evaluate the short-term and long-term equilibrium in monopolistically competitive markets.
5. Assess the impact of monopolistic competition on consumer welfare and economic efficiency.

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## 16.3 MONOPOLISTIC COMPETITION

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### 16.3.1 Meaning and Concept

Monopolistic competition is a market structure that lies between perfect competition and monopoly. It is characterized by a large number of firms producing similar but not identical products, leading to product differentiation. Each firm has some degree of market power, but because there are many competitors, no single firm can dominate the market.

#### Key Characteristics of Monopolistic Competition

1. **Large Number of Sellers:** There are many firms in the market, each holding a small market share. This ensures that the actions of one firm have a negligible impact on the overall market.
2. **Product Differentiation:** Firms produce similar but differentiated products. This differentiation can be based on quality, features, branding, or customer service. Due to product differentiation, firms have some control over their pricing.
3. **Free Entry and Exit:** There are no significant barriers to entry or exit in the market. New firms can enter the market easily if they see potential for profit, and existing firms can exit if they incur losses.
4. **Some Degree of Market Power:** Each firm has some control over its price because of product differentiation. However, the presence of close substitutes limits this power.
5. **Non-Price Competition:** Firms compete on factors other than price, such as product quality, branding, customer service, and advertising. This non-price competition is a key feature of monopolistic competition.

#### Check Your Progress

1. What are the main characteristics of monopolistic competition?  
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2. What is product differentiation? Explain its role in monopolistic competition.

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## 16.4 PRICING & MARKETING STRATEGIES IN MONOPOLISTIC COMPETITION

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Monopolistic competition is a market structure characterized by many firms producing differentiated products, each having some degree of market power. In such a market, pricing strategies are crucial for firms to maintain profitability and market share. Unlike in perfect competition, where firms are price takers, or in monopoly, where a single firm sets the price, firms in monopolistic competition have to strategically determine their prices to attract and retain customers while differentiating themselves from competitors. This essay explores the various pricing strategies employed by firms in monopolistic competition, focusing on short-run and long-run pricing, the role of demand elasticity, and the impact of non-price competition.

### Short-Run Pricing Strategies

In the short run, firms in monopolistic competition face a downward-sloping demand curve due to product differentiation. This allows them to have some control over their pricing. The primary objective of firms in the short run is to maximize profits, which they achieve by setting the output level where marginal revenue (MR) equals marginal cost (MC). The corresponding price is then determined by the demand curve at this output level.

#### 1. Profit Maximization:

- Firms determine the profit-maximizing price and output level by equating MR and MC. The price is then read off the demand curve, reflecting the highest price consumers are willing to pay for that quantity.

- For example, if a bakery produces gourmet cupcakes, it will adjust its production until the cost of making an additional cupcake equals the revenue generated from selling it. The price set will be the maximum consumers are willing to pay for that quantity, ensuring maximum short-run profits.

## 2. **Price Discrimination:**

- Some firms may engage in price discrimination, charging different prices to different customer segments based on their willingness to pay. This can be achieved through methods such as coupons, discounts for bulk purchases, or loyalty programs.
- A clothing retailer might offer student discounts or loyalty cards to regular customers, effectively segmenting the market and maximizing revenue from different customer groups.

## **Long-Run Pricing Strategies**

In the long run, the entry and exit of firms ensure that firms in monopolistic competition earn only normal profits. Economic profits attract new entrants, increasing market competition and reducing the demand faced by each firm. Conversely, economic losses lead to exits, reducing competition and increasing the demand for remaining firms.

If companies experience losses in the short-term, they will withdraw from the market. This process continues until the surviving enterprises achieve equilibrium and earn just regular earnings.

### **1. Zero Economic Profit:**

In the long run, firms earn zero economic profit as the demand curve shifts due to new entrants. Each firm's demand curve becomes tangent to its average total cost (ATC) curve, indicating normal profit.

A coffee shop, initially earning economic profits, will face increased competition as new coffee shops open. The increased supply will drive down prices and profits until only normal profits are achieved.

## 1. Product Differentiation and Innovation:

- Firms continually innovate and differentiate their products to maintain customer loyalty and avoid losing market share to new entrants. This involves improving product quality, introducing new features, or enhancing customer service.
- A Smartphone manufacturer may introduce new models with advanced features and better performance to differentiate its products from competitors and retain its customer base.

### Role of Demand Elasticity

Demand elasticity plays a significant role in pricing strategies in monopolistic competition. Firms with more elastic demand curves face greater sensitivity to price changes, while those with less elastic demand can set higher prices without losing significant market share.

#### 1. Elastic Demand:

- Firms with elastic demand must be cautious with pricing, as small price increases can lead to substantial decreases in quantity demanded. These firms often rely on competitive pricing and promotional offers to attract price-sensitive customers.

A fast-food restaurant might offer value meals or discounts to attract budget-conscious consumers, ensuring high sales volumes despite lower prices.

#### 2. Inelastic Demand:

Firms with inelastic demand can charge higher prices, as consumers are less responsive to price changes. These firms focus on creating strong brand loyalty and perceived value to justify higher prices.

A luxury car manufacturer can charge premium prices due to brand prestige and perceived quality, with customers willing to pay more for the exclusivity and status associated with the brand.

### Impact of Non-Price Competition

In monopolistic competition, non-price competition is as crucial as price competition. Firms use advertising, branding, and product differentiation to attract and retain customers. Effective non-price

competition can make the demand curve more inelastic, allowing firms to set higher prices.

**Advertising:**

Advertising plays a vital role in informing consumers about product features and benefits, creating brand awareness and loyalty. It helps differentiate products and justify higher prices.

A cosmetics company might invest heavily in advertising campaigns to highlight the unique ingredients and benefits of its products, attracting a loyal customer base willing to pay a premium.

1. **Branding:**

Strong branding creates a distinct identity and emotional connection with consumers, making them less sensitive to price changes. A well-established brand can command higher prices due to perceived value and trust.

A premium coffee brand like Starbucks leverages its brand image and customer experience to justify higher prices compared to local coffee shops.

Pricing strategies in monopolistic competition involve a delicate balance of short-run profit maximization, long-run normal profit attainment, and effective non-price competition. Firms must consider demand elasticity, product differentiation, and the competitive landscape to determine optimal pricing. By employing strategic pricing and robust marketing efforts, firms can maintain profitability and market share in a dynamic and competitive environment. Understanding these strategies provides valuable insights into how firms navigate the complexities of monopolistic competition to achieve success.

## 16.5 EQUILIBRIUM IN MONOPOLISTIC COMPETITION

### Short-Run Equilibrium:

In monopolistic competition, the demand for a firm's goods is not fully elastic due to product differentiation across competitors. In such a market, each business independently sets the price for its own items. Consequently, it confronts a demand curve that slopes downwards. In general, we may assert that the elasticity of demand rises as the level of product differentiation diminishes.

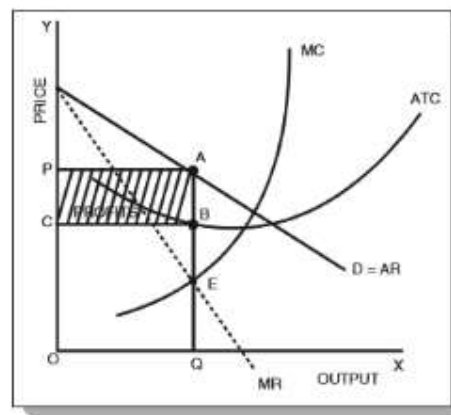


**Fig16.1 Short-Run Equilibrium of a firm in monopolistic competition: Super Normal Profit**

The diagram shown in Figure 1 illustrates a company that is confronted with a demand curve that slopes downwards but remains constant. Additionally, it exhibits a U-shaped short-run cost curve. Requirements for the equilibrium of a single business

The factors that determine the pricing and production of an individual business and the state of balance are as follows:

1.  $MC = MR$
2. The MC curve cuts the MR curve from below.

Figure 16. shows the intersection of the MC curve with the MR curve at point E. Currently,

- Equilibrium price = OP and
- Equilibrium output = OQ

Now, since the per unit cost is BQ, we have

- Per unit super-normal profit (price-cost) = AB or PC.
- Total super-normal profit = APCB

The following figure depicts a firm earning losses in the short-run.

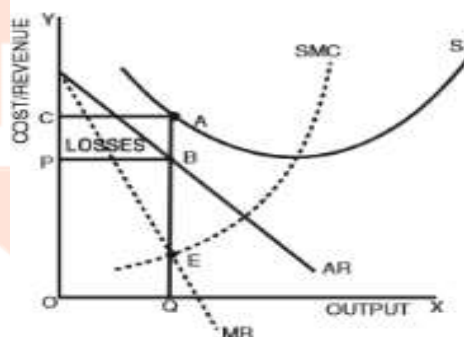


**Fig16.2 Short-Run Equilibrium of a firm in monopolistic competition-with loss**

From fig.16.2 we can see that the per unit cost is higher than the price of the firm.

Therefore,

- $AQ > OP$  (or BQ)
- Loss per unit =  $AQ - BQ = AB$
- Total Losses =  $ACPB$

### Long-run equilibrium under monopolistic competition

If enterprises in a market characterised by monopolistic competition generate profits that exceed typical levels in the near term, it will provide a motivation for new firms to join the sector. As new companies join the market, the profitability per company diminishes due to the distribution of total demand across a greater number of companies. This process continues until all enterprises achieve a state where they are making

profits that are considered average or typical. Thus, over an extended period of time, companies operating in this particular industry generate just average earnings.

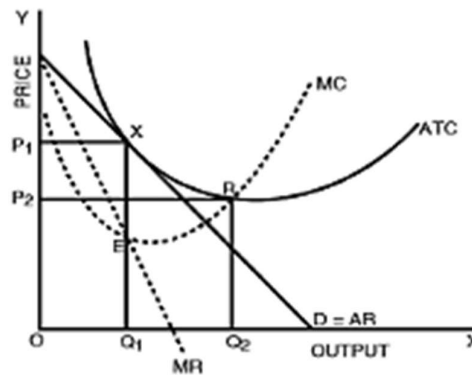


**Fig16.3 The Long-Run Equilibrium of a firm in monopolistic competition**

As seen in Figure 16.3, the average revenue (AR) curve intersects with the average cost (ATC) curve at point X. This refers to the quantity  $Q_1$  and the price  $P_1$ . At the point of equilibrium, when marginal cost (MC) equals marginal revenue (MR), all excess profits are eliminated since average revenue is equal to average expenses. Consequently, all companies either generate no extraordinary profits or simply generate average earnings.

It is crucial to acknowledge that over time, a company reaches a state of equilibrium where it has surplus capacity. Put simply, it generates a reduced amount compared to its maximum capability. Based on the information shown in Figure 3, it is evident that the company has the ability to enhance its production level from  $Q_1$  to  $Q_2$ , resulting in a decrease in average expenses. However, it fails to do so since it results in a greater reduction in average revenue compared to the reduction in average expenses. Therefore, it may be inferred that enterprises under



monopolistic competition do not perform at their maximum efficiency. Every corporation always has surplus manufacturing capacity.

If companies experience losses in the short-term, they will withdraw from the market. This process continues until the surviving enterprises achieve a state where they are earning profits that are considered typical.

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## 16.6 SUMMARY

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This unit examined the complexities of monopolistic competition, a market structure in which numerous firms offer similar yet differentiated products. Unlike perfect competition, firms in this setting possess some market power due to product differentiation, enabling them to influence prices and exercise pricing flexibility. Various pricing strategies, including cost-plus pricing, penetration pricing, skimming pricing, and psychological pricing, were explored to understand how businesses attract and retain customers. Additionally, we analyzed non-price competition, which involves product differentiation, branding, advertising, customer service, and innovation key factors that help firms establish a distinct market presence and foster customer loyalty. The significance of marginal cost (MC), marginal revenue (MR), and average total cost (ATC) was discussed, emphasizing their role in pricing and output decisions. The unit also covered short-run and long-run equilibrium in monopolistic competition, illustrating how firms may experience profits or losses in the short term but typically reach a break-even point in the long run due to market entry and exit. Furthermore, inefficiencies such as excess capacity and suboptimal resource allocation were examined, highlighting the challenges associated with this market structure. By the end of this unit, learners gained a well-rounded understanding of how firms operating in monopolistic competition set prices, implement marketing strategies, and attain equilibrium, along with the broader implications for economic efficiency.

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## 16.7 GLOSSARY

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- **Monopolistic Competition:** A market structure characterized by numerous firms offering differentiated products that are similar but not identical
- **Product Differentiation:** Making products distinct from competitors through quality, features, branding, etc.
- **Cost-Plus Pricing:** Setting prices by adding a markup to the production cost.
- **Marginal Revenue (MR):** The revenue from selling one additional unit of a product.
- **Average Total Cost (ATC):** Total production cost divided by the number of units produced.
- **Short-Term Equilibrium:** Firms may earn profits or incur losses; prices are set where  $MC = MR$ .
- **Long-Term Equilibrium:** Economic profits are zero; firms produce where the demand curve is tangent to ATC.
- **Allocative Inefficiency:** Resources are not used in a way that maximizes consumer satisfaction.
- **Productive Inefficiency:** Firms do not produce at the lowest point of their ATC curve.
- **Market Power:** The ability of a firm to influence its product's price due to differentiation.
- **Excess Capacity:** Firms produce below their efficient scale, resulting in higher ATC.

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## 16.8 EXERCISES

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1. What are the main characteristics of monopolistic competition?

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2. Describe the concept of product differentiation in monopolistic competition.

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3. Explain the cost-plus pricing strategy.

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4. What is the role of non-price competition in monopolistic competition?

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5. How does monopolistic competition affect consumer welfare and market efficiency?

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## 16.9 SUGGESTED READINGS

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1. Blinder, Alan S., and William J. Baumol. "Economics: Principles and Policy." South-Western College Pub, 2009.
2. Pindyck, Robert S., and Daniel L. Rubinfeld. "Microeconomics." Pearson, 2017.
3. Varian, Hal R. "Intermediate Microeconomics: A Modern Approach." W.W. Norton & Company, 2014.
4. Perloff, Jeffrey M. "Microeconomics: Theory and Applications with Calculus." Pearson, 2018.
5. Stiglitz, Joseph E., and Carl E. Walsh. "Economics." W.W. Norton & Company, 2006.



# **BLOCK V: OLIGOPOLY MODELS AND STRATEGIES**

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## **UNIT 17: MODELS OF NON-COLLUSIVE OLIGOPOLY**

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### **STRUCTURE**

- 17.1 Introduction
- 17.2 Objectives
- 17.3 Concept of Non-Collusive Oligopoly
  - 17.3.1 Cournot Model of Duopoly
  - 17.3.2 Bertrand Model of Duopoly
  - 17.3.3 Edgeworth Model
  - 17.3.4 Chamberlin's Oligopoly Model
  - 17.3.5 Stackelberg Model
  - 17.3.6 Kinked Demand Curve: Sweezy Model
- 17.4 Summary
- 17.5 Glossary
- 17.6 Exercises
- 17.7 Suggested Readings

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### **17.1 INTRODUCTION**

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Unit 17, "Models of Non-Collusive Oligopoly," delves into market structures where a small number of firms exert significant influence without engaging in formal agreements. Oligopolistic markets exhibit a mix of competition and strategic interdependence, affecting pricing, output decisions, and product differentiation. This unit explores key theoretical models, including Cournot, Bertrand, and Stackelberg, which provide insights into firm behavior and market outcomes. These models serve as essential tools for analyzing pricing strategies and market dynamics. Additionally, the unit examines practical applications in industries such as telecommunications and automobiles, highlighting

their impact on businesses, consumer welfare, and market efficiency. By the end of this unit, learners will develop a deeper understanding of the strategic complexities of non-collusive oligopolies, enabling them to assess market behavior effectively.

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## 17.2 OBJECTIVES

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After completing this unit, you will be able to:

1. Understand the unique features of oligopoly compared to other market structures.
2. Study strategic interactions among firms using Cournot, Stackelberg, and Bertrand models.
3. Use mathematical and graphical tools to analyze equilibrium outcomes and market dynamics.
4. Examine case studies to connect theoretical models with practical industry examples.
5. Evaluate how non-collusive oligopoly models influence competition policy and regulatory decisions.

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## 17.3 CONCEPT OF NON-COLLUSIVE OLIGOPOLY

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Oligopoly may be classified into two categories: non-collusive and collusive. In a non-collusive oligopoly, companies engage in competitiveness because they are interdependent. In collusive oligopoly, competitor enterprises engage in collaboration to optimise their shared profit by minimizing the uncertainty caused by competition.

In a non-collusive oligopoly, each business forms an anticipation of the probable actions of the other companies. This introduces a significant notion known as "Conjectural Variation" (CV) of a corporation. The CV of the  $i^{\text{th}}$  firm refers to the response of the  $j^{\text{th}}$  company when the  $i^{\text{th}}$  firm makes a little change in its strategy variable, as seen by the  $i^{\text{th}}$  firm. It specifically relates to the determination of price and output. For example, if the output was the strategic variable, then the coefficient of variation (CV) for the  $i^{\text{th}}$  company would be  $(\delta q_j / \delta q_i)$  - the change in

output level caused by the  $j^{\text{th}}$  firm for each extra change in the output level of the  $i^{\text{th}}$  firm, as seen by the firm. The presence of several models inside an oligopoly may be determined based on the characteristics of the market structure.

In the Cournot Duopoly model, the coefficient of variation (CV) for each business is zero. This is because each firm anticipates that the other firm will maintain the same level of production as in the preceding period. The Stackelberg model consists of two agents: a leader and a follower. In this scenario, the leader has knowledge about the probable actions of the follower, resulting in a favorable assessment of the leader's CV (Curriculum Vitae).

In the following sections, we will examine the process by which equilibrium is reached in significant non-collusive oligopoly models, including the Cournot model of duopoly, the Bertrand model, the Stackelberg model, the Edgeworth model, the Chamberlin model, and the Kinked Demand curve analysis of Sweezy. In order to do this, we would use the notion of response functions (RF). A company's reaction function represents the optimal response of the firm based on the choice made by its competitor.

### **17.3.1 Cournot Model of Duopoly**

The Cournot Model is named after the French economist Augustin Cournot and revolves around the strategic interaction between two firms, A and B, each producing a homogeneous product. The key assumptions include:

#### **Assumptions**

- 1) Each business encounters a market demand curve that is linear in nature.



- 2) Both companies provide indistinguishable merchandise. According to Cournot concept, it is assumed that both individuals engage in the sale of mineral water.
- 3) The cost functions are the same and the marginal cost (MC) of each business is zero.
- 4) Each business thinks that the other will maintain the same level of production as in the previous period.

### **Visual depiction**

In order to get the Cournot solution, we will make the assumption that company A is the first producer and seller in the market.

Consider  $D_1$  as the linear market demand curve, as seen in Figure 17.1. Both enterprises have a marginal cost of zero. In the diagram, this represents the horizontal axis. Firm A, as a profit maximizer, determines the amount of production  $OA$  ( $= \frac{1}{2} OD_1$ ) and price  $OP_1$  by setting marginal revenue (MR) equal to marginal cost (MC).

Assume that business B now joins the market. Given that business A is now selling  $OA$  units of output, firm B would meet the market demand by supplying  $OD_1$  minus  $OA$  units, assuming that firm A would maintain its production level at  $OA$ . Thus, the specific segment of the market demand that is applicable to business B is  $CD_1$ . This is because B is unable to offer anything at a price above  $OP_1$  due to the presence of business A in the market, which is already selling the identical goods. Therefore, the only alternative available to company B is to sell at a price below  $OP_1$ , causing the market demand curve for B to contract to  $CD_1$ . Firm B, as a profit maximizer, creates output  $AB$ , which is equal to half of A multiplied by  $D_1$ , when the marginal revenue ( $MR_B$ ) is equal to the marginal cost (MC) and both are zero.

**The available production level in the market is provided.**

The market production level following company B's entry may be described as an OA + AB Non-Collusive Oligopoly, which is equal to  $\frac{1}{2} OD_1 + \frac{1}{4} OD_1$ , or  $\frac{3}{4} OD_1$ . As the amount of production increases, the price in the market decreases to a value referred to as  $OP_2$ .

Next, business A acquires firm B in order to maintain production of AB. As a result, the market demand that firm A can meet is  $OD_1$  minus the amount of AB produced. The graphic illustrates the market demand curve for A as  $D_2$  B. Once again, assuming that  $MR_A$  is equal to MC, firm A will create  $OA_1$ , which is equal to half of OB and three-eighths of  $OD_1$ .

Firm B is now making the assumption that firm A will persist in producing  $OA_1$  and considers  $ED_1$  as the appropriate market demand curve. Assuming that  $MR_B$  (marginal revenue of company B) is equal to MC (marginal cost) and both are zero, firm B would create  $A_1B_1$ , which is equal to half of  $A_1D_1$ . In other words,  $A_1B_1$  is equal to half of the difference between 1 and  $\frac{3}{8}$ , multiplied by  $OD_1$ , which is equal to  $\frac{5}{16}$  of  $OD_1$ .

The aggregate supply in the market would be equal to the sum of  $OA_1$  and  $A_1B_1$ , which is equivalent to  $\frac{3}{8} OD_1$  plus  $\frac{5}{16} OD_1$ , resulting in a total of  $\frac{11}{16} OD_1$ . As the market supply increases, the price decreases, namely to the level of  $OP_3$ .

Therefore, it is evident that the production of company A decreases while the output of business B increases. This procedure continues until each business generates one-third of  $OD_1$ . In order to determine the equilibrium output levels of each business, we will now proceed with the derivation.

Assume that the whole market demand is represented by x units of production.

Firm A's output levels:

**Period 1:** x divided by 2

**Period 2:** One-half multiplied by the quantity one minus one-fourth, multiplied by x, equals three-eighths x, which is equal to x divided by 2 minus one-eighth x.

**Period 3:** The expression  $\frac{1}{2}(1 - 5/16)$  may be simplified to  $11x/32$ . This is equivalent to  $x/2 - x/8 - x/32$ .

$$\text{Period 4: } \frac{1}{2}(1 - 21/64) x = 43x/128 = x/2 - x/8 - x/32 - x/128$$

In the nth period, the output of firm A is

$$\begin{aligned} &= x/2 - x/8 - x/32 - x/128 - \dots \\ &= x/2 - [1/8 + 1/8 * (1/4) + 1/8 * (1/4)^2 + \dots] * x \\ &= x/2 - 1/8 * [1/(1 - 1/4)] * x \\ &= x/3 \end{aligned}$$

Output levels of firm B:

$$\text{Period 2: } \frac{1}{2}(1/2)x = x/4$$

$$\text{Period 3: } \frac{1}{2}(1 - 3/8)x = 5x/16 = x/4 + x/16$$

$$\text{Period 4: } \frac{1}{2}(1 - 11/32) x = 21x/64 = x/4 + x/16 + x/64$$

$$\text{Period 5: } \frac{1}{2}(1 - 43/128) x = 85x/256 = x/4 + x/16 + x/64 + x/256$$

In the nth period, the output of firm B is

$$\begin{aligned} &= x/4 + x/16 + x/64 + x/256 + \dots \\ &= [(1/4)/(1 - 1/4)] * x \\ &= x/3 \end{aligned}$$

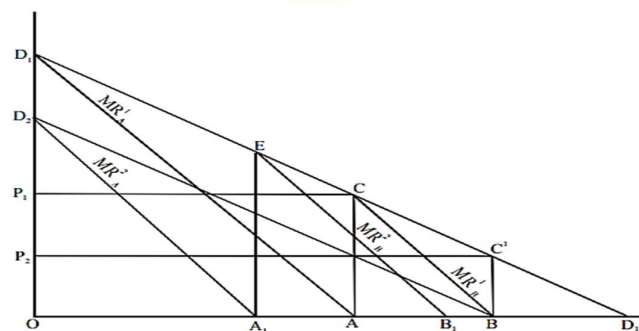


**Fig. 17 1 Demand Analysis of Cournot Equilibrium**

The reaction function approach is a valuable tool for analysing oligopolistic markets. It allows for a more straightforward analysis of the equilibrium conditions in different oligopolistic models. In this case, we will apply it to the Cournot duopoly model. In Cournot's duopoly model, he makes the assumption that firms believe their rivals will maintain their previous output levels. This means that the conjectural variation (CV) for both duopolists is zero. Under the same assumptions that both firms face a linear market demand curve, aim to maximise profit, and have a marginal cost (MC) of zero, we can express the model as follows: Let the demand function be represented by  $p = a - bq$ , where  $q = (q_i + q_j)$  represents the total market demand, and  $a$  and  $b$  are positive values. Given these assumptions, we can express the profit function for the  $i^{\text{th}}$  firm as:

$$\begin{aligned}\Pi_i &= pq_i - C(q_i); \text{ where } i = A, B \\ &= (a - bq) q_i - C(q_i) \\ &= [a - b(q_i + q_j)] q_i - C(q_i)\end{aligned}$$

Each firm being a profit maximiser, we would differentiate  $\Pi_i$  partially with respect to  $q_i$  and set the derivatives equal to zero.

$$\text{Thus, } \delta \Pi_i / \delta q_i = a - 2bq_i - b(q_j + q_i \delta q_j / \delta q_i) - \delta C / \delta q_i = 0.$$

As in this model  $CV = 0$ ,  $\delta q_j / \delta q_i = 0$ . Hence, we have,

$$a - 2bq_i - bq_j = 0 \quad (\text{as } \delta C / \delta q_i = 0, \text{ by assumption})$$

From such an optimisation exercise we get:

$$q_i^* = (a - bq_j) / 2b, \quad q_i^* = R_i(q_j) \text{ where, } q_i^* \text{ gives the profit maximising level of output of firm } i (i, j = A, B; i \neq j)$$

The equilibrium output levels of both businesses are determined by solving the two response function equations of the Non-Collusive Oligopoly. The equations are as follows:  $q_A^* = a/3b$  and  $q_B^* = a/3b$ .

$R_i$  represents the response function for each company. The reaction function determines the optimal response ( $q_i^*$ ) of the  $i^{\text{th}}$  company, which maximises its profit, based on the output level of the  $j^{\text{th}}$  business. In this exposition, the reaction functions will be represented by downward

sloping straight lines. Figure 10.2 displays the reaction function of company B as SP and the reaction function of firm A as MN.

The optimal level of production for company A, denoted as  $q_A$ , that maximises its profit may be determined from firm A's response function MN, given any level of output for firm B, denoted as  $q_B$ . Each point on the response curve of company B may be explained in a similar manner.

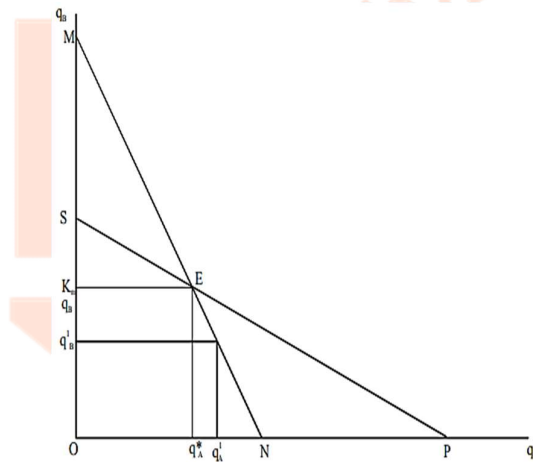


**Fig. 17.2 Cournot Equilibrium through Reaction Function**  
**Equilibrium**

Figure 17.2 illustrates this concept using a diagram. The equilibrium is achieved at the point E, where the two reaction functions meet. At this point, the equilibrium output values are  $q_A$  and  $q_B$ .

### Stability

To conduct stability analysis, we will examine Figure 17.3, where MN and SP represent the response functions of businesses A and B, respectively. In order to determine if point E is a stable equilibrium, we would start the analysis by selecting a random point and observing whether the inherent dynamics of the model would lead us to point E. The graphic illustrates that ON represents the output level of business A under a monopoly, whereas OS represents the output level of firm B. Assume that business A is the first to join the market and generates the output ON, which represents a monopoly. Subsequently, company B joins the market and makes the assumption that firm A will continue

O E q\* A q 1 A The input is a string of characters: N P q A

### 17.3.2 Bertrand Model of Duopoly

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marginal cost. In order to reach a state of equilibrium, we will examine two companies, A and B.

when business B sets a price  $P_B$ , firm A has three possible choices:

- 1) To establish a price, it is necessary that  $P_A$  be more than  $P_B$ .
- 2) To establish a price,  $P_A$  must be equal to  $P_B$ .
- 3) To establish a price,  $P_A$  must be less than  $P_B$ .

In option 1, company A loses the whole market. In scenario 3, company A monopolists the whole market, but in scenario 2, they would have an equal portion of the market. Firm A will provide lower prices than Firm B as long as the marginal cost of production ( $MC_A$ ) is less than or equal to the price charged by Firm A ( $P_A$ ). The same reasoning is applicable to company B as well.

This procedure will continue until the condition  $P = MC_A = MC_B$  is met.

### **Visual depiction**

The following illustrations depict the procedure via which enterprises achieve equilibrium in the Bertrand model. The horizontal axis represents the amount of production generated by each business, assuming that the costs are comparable. On the vertical axis, we quantify the price and marginal cost. Each graphic displays a horizontal line C that indicates the marginal cost (MC) of each company.

When the price of company A ( $P_A$ ) is higher than the price of firm B ( $P_B$ ), and both prices are higher than the cost (C), as shown in Figure 17.4, firm A will lose market share to firm B since they are selling identical products. Consequently, the profit of company A will be lower than that of business B, and firm A will offer lower prices than firm B. Firm B will see a decline in market share to firm A in the next time, resulting in a strategy to provide lower prices than business A. This process will continue until both the price and output reach equilibrium, as seen in Figure 17.5. In this scenario, both parties get an equal portion of the market. Nevertheless, the situation will not be in a state of equilibrium. This is due to the fact that if any of the entities were to slightly decrease their prices, they would capture the whole market share



and generate more profits compared to when they were evenly splitting the market. Ultimately, a state of balance will be achieved when the values of  $P_A$ ,  $P_B$ , and  $M_C$  are equal.

Figure 17.6 shows.

Figure 17.6 demonstrates a state of stable equilibrium when there is no motivation for anybody to decrease or increase the price. If the former event takes place, there is a risk of experiencing a loss due to the fact that the marginal cost exceeds the price. If the price exceeds the equilibrium price ( $P^*$ ), there is a risk of probable customer attrition. Hence, when the price exceeds or falls below  $P^*$ , it will exhibit a propensity to return to  $P^*$ , elucidating the stability of the equilibrium.

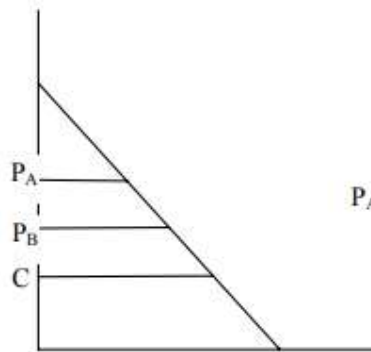


**Fig.17.4**

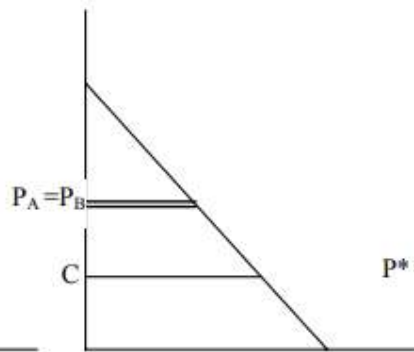


**Fig.17.5**

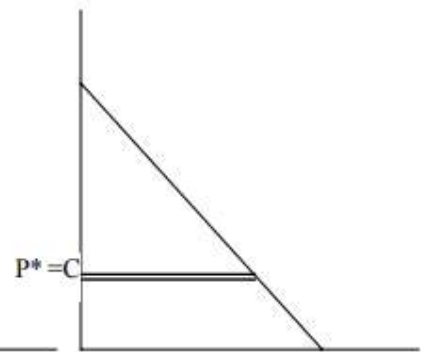


**Fig.17.6**

In the Bertrand model, the equilibrium price ( $P^*$ ) is equal to the marginal cost ( $MC$ ), resulting in a competitive solution. Consequently, production will be generated at the competitive level. This is in contrast to the Cournot model, when each duopolists output was equal to one-third of the total market demand.

### 17.3.3 Edgeworth Model

In order to examine the Edgeworth solution of oligopoly, we will examine the behaviour of two profit-maximizing firms, A and B. These firms sell a homogeneous product and have identical cost functions, where the marginal cost ( $MC$ ) is equal to zero. Additionally, we make the assumption that they encounter a linear market demand curve. In the

above diagram, DA represents the market demand encountered by business A, whereas DB represents the market demand encountered by firm B.

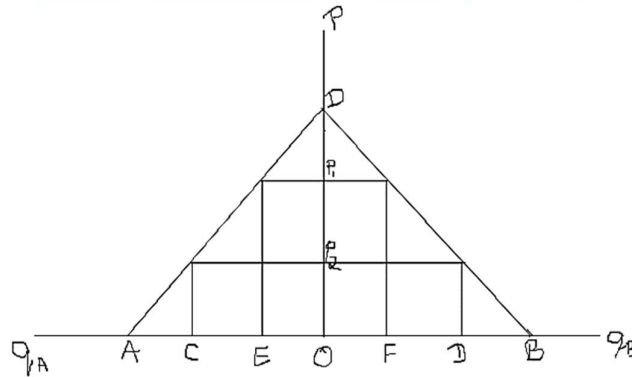


**Fig. 17.7 Edgeworth Solution**

In contrast to Bertrand, Edgeworth postulates that neither of the duopolists is capable of producing an output equivalent to that of a perfectly competitive market.

Assume that company A is the first entrant in the market. By equating the marginal revenue (MR) and marginal cost (MC), the decision is made to create the optimal level of output (OE) at the price level of  $OP_1$ . Now let's consider the scenario where B joins the market and sets a price slightly lower than  $OP_1$ , thereby attracting all of A's consumers. However, B can only meet the market demand up to OD. Therefore, the remaining quantity to be sold by business A is AC, which is equal to DB based on the given information. Instead of accepting the decrease in income, Firm A chooses to lower the price slightly below that of Firm B. Consequently, A has gained the ability to attract and retain all of B's clientele. However, once again, A is limited to selling just up to the point OC. This process will persist until the price stabilizes at  $OP_2$ , allowing both duopolists to attain the maximum possible level of production. Nevertheless, the price of  $OP_2$  is subject to instability due to the possibility of one of the enterprises increasing its pricing, hence increasing its revenue and profit (since the marginal cost is zero). For example, A will attempt to increase the price on the assumption that B

would keep it the same if OP2. A is not concerned about losing clients to B since B is now generating its maximum production, leaving the remaining market to be served exclusively by A. Now, B would likewise reassess the notion that an increase in price from OP2 would not lead to a decline in sales. Consequently, it would elevate the price to about OP1. A would reply by decreasing the price, and the same cycle repeats as before. It is seen that the price would oscillate between OP1 and OP2, indicating the absence of a stable pricing equilibrium.

#### **17.3.4 Chamberlin's Oligopoly Model**

Chamberlin proposed that an oligopolistic market may achieve a stable equilibrium by setting prices at a level equivalent to those of a monopoly. This may be achieved if the enterprises acknowledge their interdependence, in contrast to the Cournot model where they operate on the simplistic premise that their competitor maintains the same pricing or output level as the prior period.

In this model, the assumption is identical to that in Cournot's model, with the exception that the businesses acknowledge their mutual reliance.

Let us analyse the model using the diagram provided. Consider DQ as the linear market demand curve. Assume that business A is the first to join the market and sells  $OQ_1$  units at the price  $OP_1$ , ensuring that its marginal revenue (MR) equals its marginal cost (MC). As a result, firm A earns monopoly profit, which is represented by the area  $OQ_1CP_1$ .

Now, let's analyse the entrance of company B into the market. If company A generates  $OQ_1$ , then the appropriate market demand curve for firm B is determined by CQ. Thus, the optimal course of action for B, based on the condition of  $(MR = MC)$ , is to produce and sell  $Q_1Q_2$ . Consequently, the price decreases to  $OP_2$  and the combined profit earned by both parties is represented by the region  $OQ_2FP_2$ .

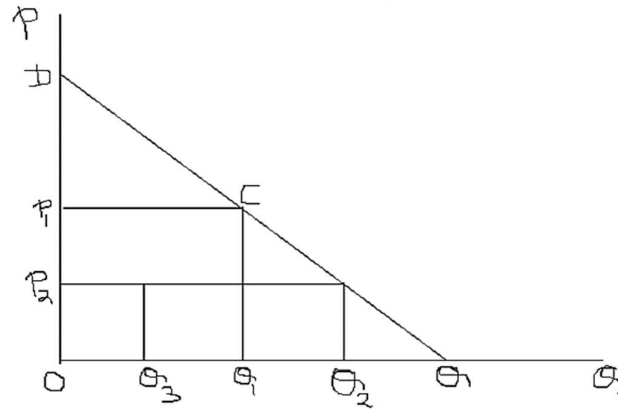


**Fig. 17.8 Chamberlin Equilibrium**

Chamberlin suggests that after business B enters the non-collusive oligopoly market, firm A will assess the market conditions and determine that sharing the profit level  $OQ_1CP_1$  is the most advantageous outcome for both firms. Consequently, company A would decrease its production level from  $OQ_1$  to  $OQ_3$ , whereas firm B would maintain the output level at  $Q_1Q_2 = Q_3Q_1$ . Under this arrangement, the companies collectively produce  $OQ_1$  and maintain the price level at  $OP_1$ . Therefore, it can be seen that company A generates half of the output quantity  $OQ_1$ , denoted as  $OQ_3$ , whereas firm B produces half of the output quantity  $OQ_1$ , represented as  $Q_3Q_1$ . The aggregate production is  $OQ_1$ , which will be sold at a price of  $OP_1$ . The monopoly profit will be divided evenly between enterprises A and B. In this particular agreement, firms create a greater quantity compared to the Cournot scenario, when each firm produces one-third of the entire market demand.

### 17.3.5 Stackelberg Model

In the Stackelberg model, the enterprises strategically determine the amount of their products. We will evaluate the model based on iso-profit curves. Assume that there are two duopolistic enterprises, A and B that want to maximise their profits. An iso-profit curve illustrates the several

combinations of production quantities for company A ( $q_A$ ) and firm B ( $q_B$ ) that would result in equal profits. Let us assume the following:

The demand function encountered by both enterprises is represented by  $p = p(q)$ , where  $q = q_A + q_B$ , which denotes the combined output generated by both firms.

The cost function  $C_i$  is defined as a function of the quantity  $q_i$ , where  $i$  represents the values A and B.

### Derivation of Iso-profit Curve:

Let's examine the profit function of company A, which is represented by  $\Pi_A = pq_A - C(q_A)$ . We will use  $\Pi_0$  as the target amount of profit. To get the iso-profit curve of company A, choose the combinations of  $q_A$  and  $q_B$  that result in a profit level of  $\Pi_0$  for the business.

$$\text{i.e., } \Pi_0 = pq_A - C(q_A) = p(q) q_A - C(q_A) = p(q_A + q_B) q_A - C(q_A)$$

In order to determine the combinations of  $q_A$  and  $q_B$ , we do a thorough differentiation of  $\Pi_0$ .

$$d\Pi_0 = p dq_A + q_A dp - \partial C / \partial q_A dq_A$$

$$\text{or, } 0 = p dq_A + q_A dp / dq (dq_A + dq_B) - \partial C / \partial q_A dq_A$$

As  $\Pi_0$  is a constant,  $d\Pi_0 = 0$  and  $p dq_A + q_A dp / dq (dq_A + dq_B) - \partial C / \partial q_A dq_A = 0$ . By simple manipulation, we see that

$dq_B / dq_A = - [(MR_A + MC_A) / (q_A dp / dq)]$ . The demand curve by assumption is downward sloping, therefore  $dp / dq < 0$ . Hence, the iso-profit curve will be  $> = < 0$  according as  $MR_A > = < MC_A$ .

The iso-profit curve will have an inverted U form, as seen in Figure 17.9.

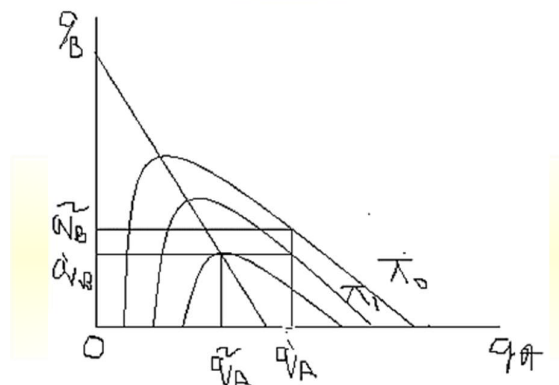


Fig. 17.9 Iso-profit Curve

The value of  $q_1$  remains constant. If the quantity of B ( $q_B$ ) grows from  $q_{1B}$  to  $q_{2B}$ , the business will move to the iso-profit curve  $\Pi_0$ , which reflects a lower level of profitability compared to the iso-profit curve  $\Pi_1$ .

Therefore, the iso-profit curves positioned farther from the horizontal axis indicate a lesser amount of profit.

business A's primary goal is to maximise profit. To do this, it will aim to create an output that is on the highest iso-profit curve, given the amount of production of business B. Assuming the production level  $q_1$  for company B, firm A may maximise its profit by generating  $q_2$  quantity of output. This optimal output level is determined by the point where the tangency occurs between the  $q_1$  iso-profit curve of firm B and the innermost iso-profit curve of firm A. Thus, the locus of the highest points of the iso-profit curves of company A is the response function of firm A.

Using a similar method, we can calculate the iso-profit curve for business B. The reaction function of a corporation represents its optimal response to every output choice made by its competitor.

The Stackelberg model of oligopoly focuses on the dominant position and leadership of a single enterprise in the market. Let firm A be the dominant player, indicating that it will propose that company B would use A's output as a piece of information when formulating its own output strategy, and B will indeed act accordingly. Put simply, company A will include this in the purpose of increasing profits for business B. Due to the absence of conjectural variation in company B, the conjectural variation in firm A is not zero. Firm B works based on the simplistic Cournot hypothesis. To clarify, company A, as the leader, may anticipate the response function of firm B and predict in advance the approach that business B would pursue. Firm A uses this information in its pursuit of optimising profits by understanding the response function of Firm B. Firm A may determine the point of tangency between its iso-profit curves and the response function of Firm B. This concept is visually



shown in the following figure. Point E represents the Stackelberg equilibrium in the diagram. If Firm B is operating on its response function, it would have no motivation to stray from E. Furthermore, because business A is actively seeking to maximise its profit, it lacks any motivation to depart from this objective. Therefore, this state of balance is secure.

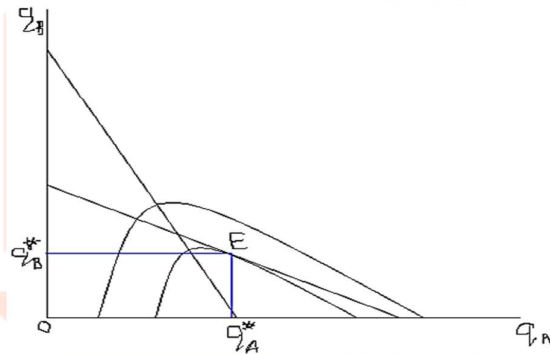


**Fig.17.10 Stackelberg Solution**

#### 17.3.6 Kinked Demand Curve: Sweezy Model

In an oligopolistic market, where businesses compete with each other, any move by one company to cut prices is seen by the others as a threat to their profits. Consequently, other companies also react by reducing their prices in a similar manner. A sequence of reductions in prices is referred to as a pricing war. In Sweezy's model, we will examine the consequences of businesses behaving according to the outlined method. Each company operating in an oligopolistic market encounters two demand curves,  $D_1D_1$  and  $D_2D_2$ , as shown in Figure 17.11.  $D_1D_1$  represents the demand curve that an oligopolist encounters while assuming that other firms do not adjust their pricing.  $D_2D_2$ , on the other hand, is drawn under the premise that if one business changes its price, all other firms will similarly change theirs.



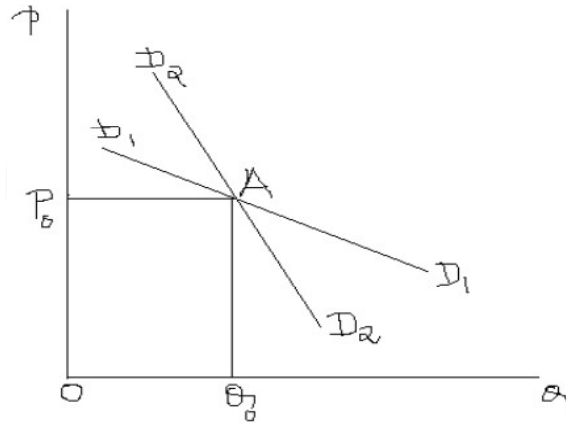


**Fig. 17.11 Demand Curves Faced by a Firm**

Let A represent the firm's current situation, characterised by a price of  $P_0$  and a quantity produced of  $Q_0$ . If the business increases its pricing, the competitors will not adopt a similar strategy, since they have the opportunity to benefit by capturing the sales of this firm. Nevertheless, when the price is lowered, others react by matching the price drop. Therefore, the firm's demand curve is represented by the  $D_1D_1$  segment to the left of point A and the  $D_2D_2$  segment to the right of point A. The demand curve that is of importance is represented by  $D_1AD_2$ , and it exhibits a sharp change in direction at point A.

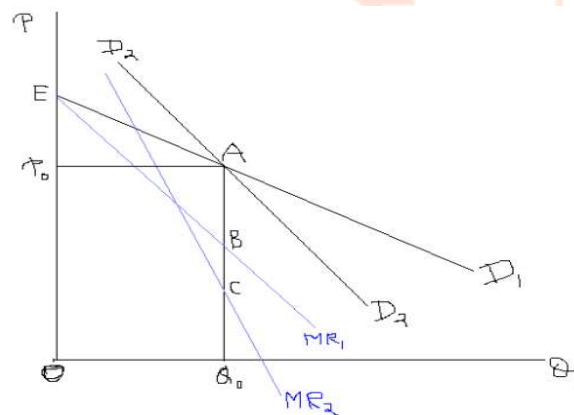


**Fig.17.12 Marginal Revenue Curves in Kinked Demand Model**

The marginal revenue curve associated with the kinked demand curve is shown as the Non-Collusive Oligopoly in Figure 17.12.  $MR_1$  represents

the marginal revenue that corresponds to the demand curve  $D_1D_1$ , whereas  $MR_2$  represents the marginal revenue curve that corresponds to the demand curve  $D_2D_2$ . The demand curve to the right of  $Q_0$  is represented by the section  $D_2D_2$ , and hence the equivalent segment of  $MR_2$  represents the marginal revenue. At quantity  $Q_0$ , there is a sharp decline in marginal revenue, occurring between point B and point C in Figure 17.12. The marginal revenue curve for the kinked demand curve seen in Figure 17.11 is represented by the line EBCF in Figure 17.12.

Observe that there exists a certain range in which changes in the firm's marginal cost do not lead to modifications in price and quantity. This is seen in Figure 17.11.

It is important to observe that in both  $MC_1$  and  $MC_2$ , the price and quantity determined by the equilibrium condition  $MC = MR$  are identical. Therefore, the price remains unchanged or resistant to change, and this economic model is sometimes referred to as the "sticky price model".

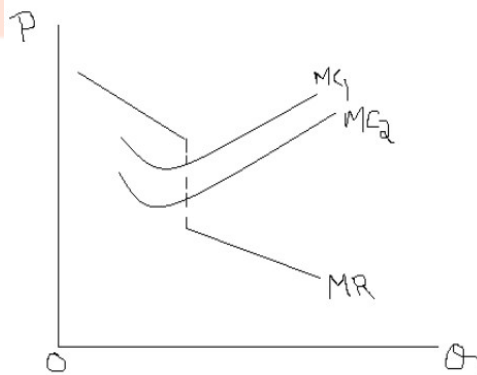


**Fig. 17.13 MR and MC Curves with Sticky Price Kinked Demand Model**

The concept of kinked demand is based on the notion that when one business in an oligopoly raises its price, other firms do not follow suit, but when one firm reduces its price, others do.

### Check Your Progress

1. What are the main characteristics of oligopoly?  
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2. How do the Cournot, Bertrand, and Stackelberg models explain firm behaviour?  
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## 17.4 SUMMARY

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In unit-17: MODELS OF NON-COLLUSIVE OLIGOPOLY," we explore the dynamics of oligopolistic markets where firms compete without collusion. The unit begins by defining oligopoly and distinguishing it from other market structures, emphasizing the strategic interactions among firms. Key models such as Cournot, Stackelberg, and Bertrand illustrate how firms' decisions on output and pricing affect market outcomes. The Cournot model focuses on quantity competition with simultaneous output decisions, leading to a specific equilibrium. The Stackelberg model introduces a leader-follower dynamic, where one firm sets its output first, influencing the follower's decisions. In contrast, the Bertrand model examines price competition, with firms setting prices simultaneously, often resulting in different equilibria. Comparative analysis of these models provides insights into strategic behaviors and their implications for market performance. Game theory principles, like the prisoner's dilemma, are applied to understand competitive strategies further. Real-world applications and empirical evidence are discussed through case studies from various industries, demonstrating how these models explain actual market behaviors. The unit also explores the regulatory and policy implications of non-collusive oligopoly, considering economic welfare and market

efficiency. In summary, this unit equips learners with a comprehensive understanding of non-collusive oligopoly models, bridging theoretical concepts with practical applications and policy considerations.

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## 17.5 GLOSSARY

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- **Non-Collusive Oligopoly:** A type of oligopoly where firms compete independently without forming alliances or agreements.
- **Cournot Model:** An economic model where firms compete on output quantities and choose their production levels simultaneously.
- **Stackelberg Model:** An oligopoly model where one firm (the leader) sets its output first, and other firms (the followers) react to this decision.
- **Bertrand Model:** A model of competition in which firms simultaneously set prices, and consumers buy from the firm offering the lowest price.
- **Nash Equilibrium:** A situation in which each firm chooses the best strategy given the strategies chosen by other firms, and no firm can benefit by changing its strategy unilaterally.
- **Strategic Interaction:** The decision-making processes where each firm's choice depends on the anticipated actions of other firms.
- **Game Theory:** A theoretical framework for conceiving social situations among competing players, used to analyze strategic interactions.
- **Prisoner's Dilemma:** A game theory concept illustrating why two rational individuals might not cooperate, even if it appears that it is in their best interest to do so.
- **Quantity Competition:** A competitive strategy where firms compete by choosing output levels rather than prices.

- **Price Competition:** A competitive strategy where firms compete by setting prices rather than output levels.

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## 17.6 EXERCISES

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1. What are the key characteristics of oligopoly, and how do they differ from perfect competition and monopoly?

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2. How do firms determine output and prices in the Cournot, Bertrand, and Stackelberg models?

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3. Explain the kinked demand curve model and its implications for price stability in oligopoly markets.

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4. How does game theory help in understanding strategic interactions among firms in non-collusive oligopoly?

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5. Discuss the efficiency and welfare implications of non-collusive oligopoly models compared to other market structures.

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## 17.7 SUGGESTED READINGS

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1. Shapiro, C., & Varian, H. R. (1998). Information Rules: A Strategic Guide to the Network Economy. Harvard Business School Press.
2. Martin, S. (2010). Industrial Organization: A European Perspective. Oxford University Press.
3. Cabral, L. (2017). Introduction to Industrial Organization. MIT Press.
4. **Online Resources:**
5. "Cournot Competition," Khan Academy: Link
6. "Oligopoly and Game Theory," Investopedia: Link
7. "Bertrand Competition," Economics Online: Link
8. <https://egyankosh.ac.in/bitstream/123456789/22880/1/Unit-10.pdf>



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## **UNIT 18: THE KINKED DEMAND CURVE MODEL**

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### **STRUCTURE**

- 18.1 Introduction
- 18.2 Objectives
- 18.3 The Kinked Demand Curve Theory
  - 18.3.1 Concept and Assumptions
  - 18.3.2 Graphical Representation
- 18.4 Price and Output Determination
  - 18.4.1 Firm's Decision-Making Process
  - 18.4.2 Market Outcomes
- 18.5 Criticisms and Limitations
  - 18.5.1 Theoretical Criticisms
  - 18.5.2 Empirical Limitations
- 18.6 Summary
- 18.7 Glossary
- 18.8 Exercises
- 18.9 Suggested Readings

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### **18.1 INTRODUCTION**

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The Kinked Demand Curve Model is a seminal concept in the study of oligopolistic markets, first introduced by economist Paul Sweezy in 1939. This model is distinctive in its ability to explain the phenomenon of price rigidity often observed in oligopolistic industries, where a few firms dominate the market. Unlike perfect competition or monopoly, oligopolies are characterized by interdependent decision-making, where the actions of one firm directly influence the outcomes of others. The kinked demand curve posits that each firm faces a demand curve that is relatively elastic for price increases above the prevailing market price and relatively inelastic for price decreases below it. This creates a kink at the current price level, resulting in a discontinuity in the marginal



revenue curve. Consequently, firms are discouraged from altering prices because increasing prices would lead to significant losses in market share, while decreasing prices would not substantially increase market share due to competitors' matching price cuts. This inherent stability in prices can be seen across various industries, from telecommunications to the automotive sector, where firms opt to compete through non-price strategies such as marketing and product differentiation. The kinked demand curve model, while insightful, is not without its criticisms. Critics disagree that it lacks a clear explanation for the initial organization of the kink and assumes static competitor behavior. Nevertheless, the model remains a valuable tool in understanding the dynamics of oligopolistic markets and the strategic interactions among firms. By delving into this unit, students will gain a comprehensive understanding of the kinked demand curve model, its underlying assumptions, and its implication for price and output determination in oligopolistic markets. This knowledge is crucial for analyzing real-world market behaviors and developing informed economic strategies.

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## **18.2 OBJECTIVES**

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After completing this unit, you will be able to:

1. Comprehend the fundamental concepts and assumptions of the kinked demand curve model.
2. Interpret the kinked demand curve graph, identifying key points and elasticities.
3. Explore how firms make pricing and output decisions based on the kinked demand curve.
4. Assess the limitations and criticisms of the kinked demand curve model.
5. Apply the model to real-world industries and market scenarios through case studies.

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## 18.3 THE KINKED DEMAND CURVE THEORY

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### 18.3.1 Concept and Assumptions

The kinked demand curve model provides a theoretical framework to understand pricing dynamics in oligopolistic markets, where a small number of firms dominate the industry. This model is based on several key assumptions:

1. **Oligopolistic Market Structure:** The market consists of a few large firms that possess substantial market power, allowing them to influence market prices through their actions and decisions.
2. **Elasticity of Demand:** Firms in this model face a demand curve that exhibits differing elasticities based on price changes:

**Relatively Elastic Demand for Price Increases:** Above the prevailing market price, demand for the firm's product is relatively elastic. This means that consumers are sensitive to price increases, leading to a significant decrease in quantity demanded if the firm raises its price.

**Relatively Inelastic Demand for Price Decreases:** Below the prevailing market price, demand becomes relatively inelastic. Consumers are less responsive to price decreases, resulting in a smaller increase in quantity demanded if the firm lowers its price.

3. **Discontinuity in Marginal Revenue:** The kink in the demand curve results in a discontinuity in the marginal revenue curve. This occurs because marginal revenue (MR) changes abruptly at the kink point where the demand curve shifts from elastic to inelastic. Above the kink, where demand is elastic, a small change in price leads to a proportionally larger change in quantity demanded, affecting MR differently than below the kink where demand is inelastic.

These assumptions collectively form the basis of the kinked demand curve model, providing insights into why prices in oligopolistic markets

tend to be stable despite external shocks such as changes in costs or demand fluctuations. Firms under this model anticipate and react strategically to their competitors' pricing decisions, often leading to a scenario where prices remain unchanged for extended periods unless external factors significantly alter market conditions.

### 18.3.2 Graphical Representation

The graphical representation of the Kinked Demand Curve Model is pivotal in understanding how firms in oligopolistic markets determine prices and outputs based on strategic interactions with their competitors. This section explores the graphical depiction and key elements of the model:

#### Graphical Depiction

1. **Demand Curve:** The demand curve faced by each firm in the oligopoly typically slopes downward, indicating the relationship between the price of a product and the quantity demanded by consumers.
2. **Kink Point:** The kink in the demand curve marks a critical point where the curve changes its slope abruptly. Above this point, the demand curve is relatively elastic due to consumers' sensitivity to price increases. Below this point, the demand curve is relatively inelastic because consumers are less responsive to price decreases.
3. **Marginal Revenue Curve:** The marginal revenue (MR) curve derived from the demand curve exhibits a discontinuity at the kink point. This discontinuity reflects how changes in price affect revenue differently above and below the kink. Above the kink, where demand is elastic, a small decrease in price leads to a significant increase in quantity demanded, thereby reducing total revenue marginally. Conversely, below the kink, where demand is inelastic, a price decrease results in only a small increase in quantity demanded, leading to a more substantial reduction in total revenue.

### Implications for Price and Output Determination

The graphical representation of the kinked demand curve model illustrates several implications for firms:

- **Price Stability:** Prices tend to remain stable around the kink point because firms have little incentive to change prices. Increasing prices above the kink would lead to a significant loss in market share, while decreasing prices below the kink would not result in a substantial gain in market share.
- **Output Adjustment:** Firms adjust their output levels more in response to changes in costs rather than changes in demand. This is because changes in output do not necessarily lead to proportional changes in revenue due to the kink in the demand curve.
- **Strategic Interactions:** Firms engage in non-price competition strategies such as advertising, product differentiation, and quality improvements to maintain market share without resorting to price adjustments.

### Practical Application

Understanding the graphical representation of the kinked demand curve model enables economists and policymakers to analyze and predict market behaviors in oligopolistic industries. By studying how firms react to changes in costs and competitor actions, stakeholders can formulate strategies and policies that promote competition while ensuring market stability and consumer welfare.

The graphical representation of the Kinked Demand Curve Model is pivotal in understanding how firms in oligopolistic markets determine prices and outputs based on strategic interactions with their competitors. This section explores the graphical depiction and key elements of the model:

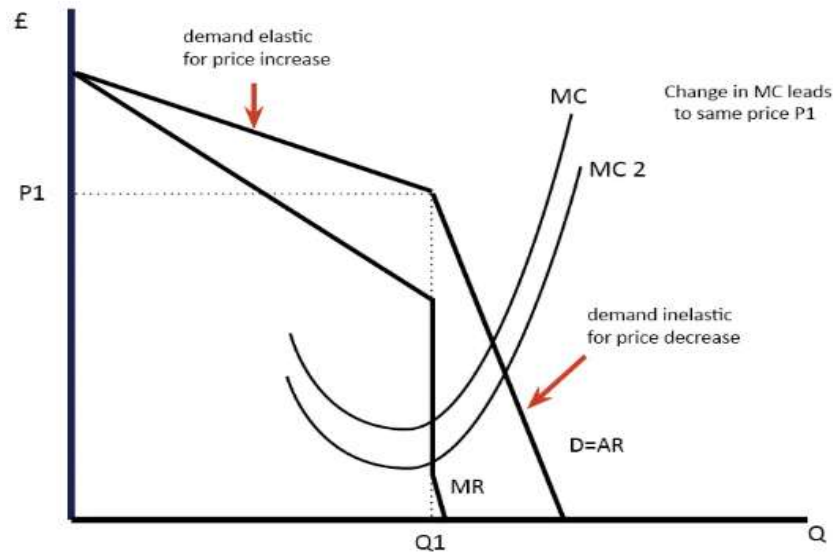


**Fig.18.1 Kinked Demand Curve**

According to the kinked demand curve model, the company achieves maximum profits when the quantity demanded is  $Q_1$  and the price is  $P_1$ , at which point marginal revenue (MR) equals marginal cost (MC). Therefore, a modification in MC may not have an impact on the market price. It indicates that prices are expected to remain relatively constant.

## **18.4 PRICE AND OUTPUT DETERMINATION**

In the kinked demand curve model, the determination of price and output levels is heavily influenced by the strategic interactions between firms in an oligopolistic market. This section delves into how firms decide on pricing and production based on the unique characteristics of the kinked demand curve.

### **18.4.1 Firm's Decision-Making Process**

**1.Price Rigidity:** The kinked demand curve model predicts that firms are unlikely to change their prices frequently. This is due to the differential elasticity of demand above and below the prevailing market price.

- **Above the Kink:** If a firm raises its price above the kink point, it faces a highly elastic demand. Consumers would likely switch to competitors, leading to a significant loss in market share.
- **Below the Kink:** If a firm lowers its price below the kink point, it faces relatively inelastic demand. Competitors are expected to match the price cut, resulting in minimal gain in market share and potentially triggering a price war.

## 2. Marginal Revenue Curve:

**Discontinuity:** The kink in the demand curve creates a discontinuity in the marginal revenue (MR) curve. This discontinuity implies that small changes in marginal cost (MC) within a certain range do not affect the firm's optimal price or output level.

**Above the Kink:** The MR curve is steeper, indicating a rapid decrease in revenue with price increases.

**Below the Kink:** The MR curve is flatter, showing a less pronounced revenue decrease with price reductions.

## 3. Optimal Pricing:

**Stable Prices:** Firms will maintain prices at the kink point unless significant external factors (e.g., substantial changes in costs or demand) force a reevaluation of pricing strategies. This stability is a hallmark of the kinked demand curve model, as firms prefer to compete through non-price methods such as marketing, product quality, and customer service.

## 18.4.2 Market Outcomes

### 1. Non-Price Competition:

**Strategies:** Due to price rigidity, firms often engage in non-price competition to attract and retain customers. This includes:

- **Advertising and Marketing:** Enhancing brand recognition and loyalty.

- **Product Differentiation:** Improving product features, quality, and variety.
- **Customer Service:** Offering superior customer support and service policies.

## 2. Output Levels:

**Adjustment to Costs:** Firms adjust their output levels in response to changes in production costs rather than changes in price. Since prices are stable, changes in cost structures (e.g., raw material prices, labor costs) influence the quantity produced.

**Profit Maximization:** Firms aim to produce at a level where marginal cost equals marginal revenue ( $MC = MR$ ). Due to the kink, this condition might hold over a range of output levels, contributing to output stability.

## 3. Long-Term Equilibrium:

**Market Dynamics:** Over time, if external conditions remain stable, the kinked demand curve model predicts a stable price and output equilibrium in oligopolistic markets. However, significant shifts in technology, consumer preferences, or regulatory changes can alter the market dynamics, prompting firms to re-evaluate their strategies.

### 18.4.3 Strategic Implications

#### 1. Anticipating Competitor Reactions:

**Predictive Behavior:** Firms must anticipate the reactions of their competitors when considering any changes in pricing or output. The expectation that competitors will match price decreases but not price increases reinforce price rigidity.

#### 2. Market Entry and Exit:

- **Barriers to Entry:** High barriers to entry in oligopolistic markets ensure that the existing firms maintain their



market power and continue to influence pricing and output decisions. Potential new entrants must consider these barriers and the competitive response they may face.

### 3. Policy and Regulation:

- **Government Intervention:** Policymakers must understand the dynamics of oligopolistic markets and the kinked demand curve model to implement effective regulations. This can include measures to promote competition, prevent collusion, and protect consumer interests.

### Check Your Progress

1. What are the main assumptions of the Kinked Demand Curve Model?

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2. How does the Kinked Demand Curve Model explain price rigidity in oligopoly?

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## 18.5 CRITICISMS AND LIMITATIONS

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The Kinked Demand Curve Model, despite its innovative approach to explaining price rigidity in oligopolistic markets, has been subject to several criticisms and limitations. These can be broadly categorized into **theoretical criticisms** and **empirical limitations**.

### 18.5.1 Theoretical Criticisms

- **Lack of Foundation in Firm Behavior:** The model does not provide a concrete explanation of how the initial price level is determined. It assumes that the price has already been set, which

makes it incomplete in addressing how oligopolists arrive at their price decisions.

- **Absence of Dynamic Analysis:** The model assumes static conditions, ignoring the dynamic nature of real-world markets. Firms in oligopoly do not always rely on static expectations about rivals' reactions; they often employ strategies that involve innovation, marketing, or changing production processes.
- **Simplistic Assumptions about Rivals' Reactions:** The model assumes asymmetric reactions from competitors—price reductions are matched, but price increases are not. This assumption may not always hold true as rival firms might not behave uniformly in response to price changes.
- **Neglect of Non-Price Competition:** Oligopolistic firms often compete on non-price factors such as product quality, advertising, and customer service. The model focuses solely on price competition, thereby failing to account for other competitive strategies.
- **Incompatibility with Certain Market Structures:** The Kinked Demand Curve Model is applicable only to markets with a few dominant firms and limited entry. It does not address markets with high levels of entry or those where firms engage in frequent price wars.

#### 18.5.2 Empirical Limitations

- **Limited Empirical Evidence of Kinks in Demand Curves:** Studies have shown that demand curves in real-world oligopolistic markets are not always kinked. Firms often experiment with price changes without observing the predicted rigidities suggested by the model.
- **Inconsistent Observations of Price Rigidity:** While the model explains price rigidity, real-world markets often experience price

fluctuations due to external factors such as changes in input costs, demand shocks, or government policies.

- **Failure to Explain All Oligopoly Outcomes:** The model fails to account for collusion or cooperative behavior among firms, which is often observed in oligopolistic markets. For example, cartels like OPEC operate on agreed price levels, contrary to the independent decision-making assumed in the model.
- **Overemphasis on Price as the Sole Determinant:** Real-world studies suggest that firms may prioritize long-term profitability and market share over immediate price adjustments, challenging the relevance of the model in certain industries.

While the Kinked Demand Curve Model provides valuable insights into price rigidity in oligopoly, it is limited in scope and application. It serves as a partial explanation rather than a comprehensive theory of oligopolistic behaviour. Its assumptions, particularly about rival reactions and price stickiness, make it less applicable in dynamic and diverse market environments.

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## 18.6 SUMMARY

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The Kinked Demand Curve Model offers a crucial insight into the pricing behaviour of firms in oligopolistic markets, where a few firms dominate and their decisions are interdependent. This model explains why prices tend to remain stable despite changes in demand or costs, attributing this rigidity to the asymmetric response of firms to price changes. If a firm raises its price, competitors will not follow, leading to a significant loss in market share. Conversely, if a firm lowers its price, competitors will match the decrease, preventing any substantial gain in market share. This results in a kink in the demand curve at the prevailing price and a corresponding discontinuity in the marginal revenue curve. While the model effectively describes price stability, it has been criticized for not explaining how the initial price level is set and for

assuming static competitor behavior. Despite these limitations, the kinked demand curve remains a valuable tool for understanding oligopolistic markets. By studying this unit, students gain insights into the strategic interactions among firms and the implications for market prices and outputs. This knowledge is essential for analyzing competitive behaviour and making informed economic decisions in real-world oligopolistic industries.

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## 18.7 GLOSSARY

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- **Oligopoly:** A market structure characterized by a small number of large firms dominating the industry.
- **Interdependence:** The situation where the decisions of one firm directly affect the decisions and outcomes of other firms in the market.
- **Price Rigidity:** The tendency of prices to remain stable or change slowly despite fluctuations in demand or costs.
- **Kinked Demand Curve:** A demand curve that is elastic above a certain price and inelastic below it, creating a kink at the current market price.
- **Elasticity:** A measure of the responsiveness of quantity demanded or supplied to changes in price or other factors.
- **Marginal Revenue:** The additional revenue generated from selling one more unit of a good or service.
- **Market Share:** The percentage of total industry sales accounted for by a particular firm or product.
- **Non-price Competition:** Competition based on factors other than price, such as product differentiation, advertising, or customer service.
- **Strategic Behavior:** Deliberate actions taken by firms to maximize their own profits while considering the reactions of competitors.

- **Price Leadership:** A situation where one firm in an oligopoly sets a price that other firms in the industry follow.
- **Barriers to Entry:** Factors that make it difficult for new firms to enter a market, such as high startup costs or legal restrictions.
- **Game Theory:** A branch of mathematics used to model strategic interactions between decision-makers, such as firms in oligopolistic markets.
- **Market Power:** The ability of a firm or group of firms to influence market prices and conditions.
- **Collusion:** Secret or illegal cooperation between firms to control prices or exclude competition.
- **Empirical Analysis:** Examination of real-world data and observations to test economic theories and models, including the kinked demand curve model.

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## 18.8 EXERCISES

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1. What is the kinked demand curve model? Explain how it predicts price stability in markets dominated by a few large firms.

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2. How do firms in oligopolistic markets behave according to the kinked demand curve model? Discuss why they might hesitate to change prices.

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3. Provide an example of a real-world industry where the kinked demand curve model could apply. Describe how this model helps understand pricing decisions in that industry.

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4. Why is the kinked demand curve model criticized? Discuss one limitation of the model and how it affects its ability to explain real-world pricing behavior.

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5. How might understanding the kinked demand curve model influence business strategies in oligopolistic markets? Discuss one strategic implication for firms operating in such markets.

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## 18.9 SUGGESTED READINGS

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1. AS Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach (9th ed.). W. W. Norton & Company.
2. Pindyck, R. S., & Rubinfeld, D. L. (2017). Microeconomics (9th ed.). Pearson.
1. Sweezy, P. M. (1939). Demand under Conditions of Oligopoly. Journal of Political Economy, 47(4), 568-573. doi:10.1086/255006
2. Stigler, G. J. (1947). The Kinky Oligopoly Demand Curve and Rigid Prices. Journal of Political Economy, 55(5), 432-449. doi:10.1086/256992

### Online Resources

1. Investopedia. (n.d.). Kinked Demand Curve. Retrieved from <https://www.investopedia.com/terms/k/kinkeddemandcurve.asp>
2. Khan Academy. (n.d.). Oligopoly and game theory. Retrieved from <https://www.khanacademy.org/economics-finance-domain/microeconomics>
3. <https://www.economicsdiscussion.net/oligopoly/the-kinked-demand-model-with-diagram/5444>





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## **UNIT 19: STRATEGIES IN COLLUSIVE OLIGOPOLY**

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### **STRUCTURE**

- 19.1 Introduction
- 19.2 Objectives
- 19.3 Concept and Types of Collusion
  - 19.3.1 Definition of Collusion
  - 19.3.2 Types of Collusion
- 19.4 Factors Influencing Collusion
  - 19.4.1 Market Characteristics
  - 19.4.2 Economic Conditions
  - 19.4.3 Regulatory Environment
- 19.5 Strategies in Collusive Oligopoly
  - 19.5.1 Price Leadership
  - 19.5.2 Market Sharing
  - 19.5.3 Output and Capacity Management
- 19.6 Economic and Legal Implications
- 19.7 Summary
- 19.8 Glossary
- 19.9 Exercises
- 19.10 Suggested Readings

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### **19.1 INTRODUCTION**

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In the study of microeconomics, the behaviour of firms within oligopolistic markets is a critical area of focus, particularly regarding how these firms strategize to maximize profits. "UNIT 19: STRATEGIES IN COLLUSIVE OLIGOPOLY" delves into the intriguing dynamics where firms, instead of competing aggressively, opt to collaborate covertly to control market outcomes. Collusion, whether in the form of formal agreements or implicit mutual understandings, enables firms to coordinate strategies to influence prices, limit production, and divide market territories for their collective advantage.

This unit examines the various strategies employed by firms engaged in collusive behaviour, such as price leadership, market sharing, and production quotas, while also identifying the economic and structural conditions that facilitate such cooperation. Factors like a limited number of firms, high barriers to entry, and market transparency are crucial in enabling collusion. Furthermore, the unit explores the broader economic implications of collusion, including its impact on consumer welfare and market efficiency, often leading to higher prices and reduced innovation. The legal framework surrounding collusion, particularly antitrust laws and regulatory enforcement, is also addressed, highlighting the measures taken to prevent anti-competitive practices. Through the analysis of historical and contemporary case studies, such as OPEC's oil production agreements and the lysine price-fixing cartel, the unit provides real-world context to the theoretical concepts. Ultimately, understanding the strategies in collusive oligopoly is essential for economists, policymakers, and regulators aiming to promote competitive markets and safeguard consumer interests against the adverse effects of collusive behaviour.

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## **19.2 OBJECTIVES**

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By the end of this unit, you will be able to:

1. Know the concept and types of collusion in oligopolistic markets.
2. Analyze the factors that promote or hinder collusive behaviour among firms.
3. Examine the various strategies employed in collusive oligopoly.
4. Evaluate the economic and legal implications of collusion.
5. Discuss case studies and real-world examples of collusive behavior.

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## 19.3 CONCEPT AND TYPES OF COLLUSION

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Collusion in oligopolistic markets occurs when firms agree, either explicitly or implicitly, to coordinate their actions to reduce competition and maximize joint profits. This section explores the concept of collusion, its types, and how firms employ these strategies.

### 19.3.1 Definition of Collusion

Collusion refers to the cooperation between firms in an oligopolistic market to set prices, limit production, or divide markets among themselves. The primary objective of collusion is to increase collective profits by reducing competition. When firms collude, they can act similarly to a monopolist, setting prices above competitive levels and restricting output to maintain higher profit margins.

### 19.3.2 Types of Collusion

Collusion can be categorized into two main types: explicit and implicit.

#### 19.3.2.1. Explicit Collusion

Explicit collusion involves direct communication and formal agreements between firms to coordinate their actions. This type of collusion is often illegal and subject to antitrust regulations. Two common forms of explicit collusion are cartels and price-fixing.

##### 1. Cartels:

**Definition:** A cartel is a formal organization of producers who agree to coordinate prices and production to maximize joint profits. Members of a cartel may agree on production quotas, minimum prices, or market shares.

**Example:** One of the most well-known cartels is the Organization of the Petroleum Exporting Countries (OPEC). OPEC member countries agree on oil production levels to influence global oil prices. By controlling supply, OPEC aims to stabilize or increase oil prices, benefiting the member countries.

**Characteristics:** Cartels require a high level of trust and enforcement mechanisms to ensure compliance among members. They are often

unstable due to incentives for individual members to cheat by producing more than agreed upon to gain additional profits.

#### **1. Price Fixing:**

**Definition:** Price fixing occurs when firms explicitly agree to set the prices of their products at a certain level, rather than allowing market forces to determine prices.

**Example:** The lysine price-fixing cartel in the 1990s involved several companies that produced lysine, an animal feed additive. These firms agreed to fix prices and allocate market shares, leading to inflated prices for lysine.

**Characteristics:** Price fixing is typically easier to implement in markets with homogeneous products, as it simplifies the coordination of prices. However, it is illegal in many jurisdictions and subject to severe penalties if discovered.

#### **19.3.2.2. Implicit Collusion**

Implicit collusion, also known as tacit collusion, occurs without direct communication or formal agreements. Instead, firms coordinate their actions based on mutual understanding and recognition of their interdependence. Tacit collusion is harder to detect and prove legally.

##### **1. Tacit Collusion:**

**Definition:** Tacit collusion involves firms indirectly coordinating their behavior by observing and responding to each other's actions. This can lead to coordinated outcomes similar to those achieved through explicit agreements, but without direct communication.

**Example:** In the airline industry, firms may engage in tacit collusion by matching each other's prices on certain routes. If one airline raises its fares, others may follow suit to avoid a price war, maintaining higher prices collectively.

**Characteristics:** Tacit collusion is often facilitated by repeated interactions, market transparency, and a high degree of interdependence among firms. It is more common in markets with few competitors and consistent demand patterns.

## **2. Price Leadership:**

**Definition:** Price leadership is a specific form of tacit collusion where one firm, typically the dominant or most efficient firm in the market, sets the price for a product, and other firms follow suit.

**Example:** In the steel industry, a leading firm may announce a price increase, and other firms will raise their prices to the same level. This behavior avoids direct price competition and maintains higher prices across the industry.

**Characteristics:** Price leadership can be either barometric or dominant. In barometric price leadership, a firm known for its market acumen and ability to predict market conditions sets the price. In dominant price leadership, the largest or most influential firm in the market sets the price, and others follow to avoid competitive disadvantages.

### **3.2.3. Market Sharing**

Market sharing involves firms agreeing to divide the market among themselves to minimize competition. This can be done by geographical regions, customer segments, or product lines.

#### **1. Geographical Division:**

**Definition:** Firms agree to operate in specific geographic areas, avoiding competition by not entering each other's territories.

**Example:** Two telecommunications companies might agree that one will serve the northern region while the other serves the southern region, preventing direct competition and allowing each to maintain higher prices within their respective areas.

**Characteristics:** Geographical division reduces competitive pressures and allows firms to act as local monopolies within their designated areas.

#### **2. Customer Allocation:**

**Definition:** Firms divide the market by assigning specific customers or customer groups to each firm, avoiding direct competition for the same customers.

**Example:** In the early 20th century, some railroads agreed to allocate customers based on the type of goods being transported, ensuring that each railroad had a monopoly over specific types of cargo.

**Characteristics:** Customer allocation agreements can be more challenging to detect and enforce but can effectively reduce competition and maintain higher prices.

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## 19.4 FACTORS INFLUENCING COLLUSION

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In oligopolistic markets, collusion among firms can be influenced by various factors. These factors can either facilitate or hinder the ability of firms to collude successfully. Understanding these factors is crucial for analyzing how and why collusion occurs and the conditions under which it is likely to be sustained. Collusion is a common phenomenon in marketplaces characterized by oligopoly. The market is characterized by a limited number of participants, and each of them has strategic interdependencies. Companies monitor and analyze their rivals' plans in order to shape their own strategy.

### 19.4.1 Market Characteristics

#### 1. Number of Firms:

**Small Number of Firms:** Collusion is more feasible and sustainable in markets with fewer firms. With a smaller number of competitors, reaching agreements and ensuring adherence becomes easier. However, as the number of firms grows, coordination becomes more difficult, and the risk of defection increases, reducing the chances of successful collusion.

**Example:** The airline industry, where a few dominant airlines can more easily agree on pricing strategies compared to an industry with numerous small competitors.

## **2. Product Homogeneity:**

**Standardized Products:** When firms produce homogeneous or similar products, it simplifies the process of agreeing on prices or output levels. Differentiated products make it more challenging to establish common pricing strategies.

**Example:** The cement industry, where the product is relatively uniform, making it easier for firms to agree on prices.

## **3. Market Transparency:**

**High Transparency:** Markets with high transparency allow firms to easily observe each other's actions, making it easier to detect deviations from collusive agreements. Transparency in pricing, production levels, and other competitive actions supports collusion by reducing uncertainty and enhancing trust.

**Example:** The retail gasoline market, where prices are openly displayed, allowing competitors to quickly match price changes.

### **19.4.2 Economic Conditions**

#### **1. Stable Demand:**

**Predictable Market Conditions:** Collusion is more sustainable in markets with stable and predictable demand. Fluctuations in demand can disrupt collusive agreements as firms may be tempted to cheat to gain market share during high-demand periods.

**Example:** The utilities industry, where demand for electricity and water is relatively stable, facilitating long-term collusive arrangements.

#### **2. High Entry Barriers:**

**Preventing New Entrants:** Significant obstacles like hefty capital investment, established brand loyalty, or strict regulatory frameworks discourage new players from entering the market. This lack of competition enables current firms to sustain collusive arrangements without the risk of newcomers lowering prices.

**Example:** The pharmaceutical industry, where significant R&D costs and regulatory approvals act as entry barriers.



### 19.4.3 Regulatory Environment

#### 1. Legal Framework:

**1. Role of Antitrust Laws:** The existence and strict implementation of antitrust laws are crucial in discouraging collusion. Strong legal frameworks and proactive monitoring by authorities make firms think twice before engaging in such practices due to the potential for legal action and penalties.

**Example:** The Sherman Antitrust Act in the U.S. serves as a legal barrier against activities like price-fixing and dividing markets.

**2. Impact of Penalties:** Harsh penalties can significantly reduce the likelihood of firms attempting to collude. The risk of facing substantial fines, legal proceedings, and damage to reputation often outweighs any short-term gains from collusive arrangements.

**Example:** The European Commission has imposed severe fines on companies involved in cartels, such as the substantial penalties levied against leading truck producers for fixing prices.

### 19.4.4 Firm-Specific Factors

#### 1. Similar Cost Structures:

**Aligned Interests:** Firms that have comparable cost structures can more easily reach agreements on pricing and production levels, since their profit margins and motivations are closely aligned. Divergent cost structures can lead to disagreements on optimal pricing and production strategies.

**Example:** The agricultural sector, where firms face similar costs for inputs like seeds, fertilizers, and labor.

#### 2. Past History of Cooperation:

**Trust and Experience:** A history of successful cooperation and trust among firms can facilitate future collusion. Past experiences of working together create a foundation of trust, making it easier to reach and sustain collusive agreements.

**Example:** The airline industry, where code-sharing agreements and joint ventures build a cooperative environment conducive to collusion.

### **3. Communication Channels:**

**Ease of Coordination:** Effective communication channels, whether direct or indirect, are essential for coordinating collusive behavior. Firms must be able to signal intentions and detect compliance or deviations.

**Example:** Trade associations or industry conferences can provide forums for firms to discuss and align their strategies, even if indirectly.

### **19.4.5 Market Behavior and Expectations**

#### **1. Retaliation Mechanisms:**

**Threat of Punishment:** The ability and willingness of firms to retaliate against cheating can sustain collusion. If firms anticipate that breaking the agreement will result in a price war or other penalties, they are less inclined to deviate.

**Example:** The steel industry, where firms may retaliate by flooding the market with excess supply if a competitor undercuts agreed-upon prices.

#### **2. Length of Interaction:**

**Repeated Interaction:** Collusion is more likely to be successful in markets where firms interact repeatedly over time. Long-term relationships enable firms to develop mutual trust and establish reputations, making collusion more stable.

**Example:** The airline industry, where firms compete on the same routes over extended periods, allowing for repeated interactions and the potential for tacit collusion.

The factors influencing collusion in oligopolistic markets are multifaceted, encompassing market characteristics, economic conditions, regulatory environments, firm-specific factors, and market behaviors. Understanding these factors helps in analyzing the likelihood and sustainability of collusion, as well as the effectiveness of policies designed to prevent anti-competitive practices. By examining real-world examples and theoretical insights, we gain a comprehensive understanding of how and why firms might engage in collusive

behavior, and the conditions under which such behavior can be effectively deterred.

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## 19.5 STRATEGIES IN COLLUSIVE OLIGOPOLY

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In oligopolistic markets, firms often engage in various strategies to collude, either explicitly or implicitly, to maximize their collective profits and reduce competition. This section explores the different strategies employed by firms to achieve and sustain collusion.

### 19.5.1 Price Fixing

#### 1. Definition:

Price fixing involves a clear, intentional agreement between firms to establish prices at a predetermined level, bypassing natural market dynamics. This approach allows the participating firms to sustain elevated prices and avoid competitive price cuts.

#### 2. Mechanisms:

**Direct Communication:** Firms communicate directly to agree on prices. This can be done through meetings, phone calls, or written agreements.

**Secret Meetings:** Firms might hold secret meetings to discuss and agree on pricing strategies, ensuring that their agreement is not detected by regulatory authorities.

#### 3. Example:

The lysine price-fixing cartel in the 1990s, where several companies' producing lysine, an animal feed additive, agreed to fix prices and allocate market shares, leading to inflated prices for lysine.

#### 4. Risks:

In many regions, price fixing is considered a criminal offense and can lead to harsh consequences such as substantial fines and imprisonment. Companies found engaging in such practices also face serious harm to their public image and credibility.

### 19.5.2 Market Sharing

#### 1. Definition:

Market sharing involves dividing the market among firms to avoid direct competition. This can be done geographically, by customer segment, or by product line.

#### 2. Mechanisms:

**Geographical Division:** Firms agree to operate in specific regions, avoiding competition by not entering each other's territories.

**Customer Allocation:** Firms divide the market by assigning specific customers or customer groups to each firm.

#### 3. Example:

Telecom firms may divide the market geographically, with one provider operating in the northern zone and another in the southern, thereby avoiding direct rivalry and enabling each to sustain elevated prices within their designated regions.

#### 4. Benefits:

Dividing the market among firms often results in reduced competition, allowing each company to maintain steady market shares and charge higher prices.

### 19.5.3 Production Quotas

#### 1. Definition:

Production quotas involve firms agreeing to limit their output to control supply and maintain higher prices.

#### 2. Mechanisms:

**Setting Limits:** Firms agree on the maximum amount of product each firm can produce.

**Monitoring Compliance:** Firms monitor each other's production levels to ensure adherence to the agreed quotas.

#### 3. Example:

OPEC (Organization of the Petroleum Exporting Countries) members agree on oil production levels to influence global oil prices. By

controlling supply, OPEC aims to stabilize or increase oil prices, benefiting member countries.

#### **4. Challenges:**

Production quotas require significant trust among firms, as there is always an incentive for individual firms to cheat by producing more than agreed upon to gain additional profits.

### **19.5.4 Price Leadership**

#### **1. Definition:**

Price leadership is a form of tacit collusion where one firm, typically the dominant or most efficient firm in the market, sets the price for a product, and other firms follow suit.

#### **2. Mechanisms:**

**Announcing Price Changes:** The leading firm announces price changes, and other firms match these changes to maintain a stable pricing structure.

**Signaling Intentions:** The leading firm signals its pricing intentions through public announcements or other means, allowing others to follow.

#### **3. Example:**

In the steel industry, a leading firm may announce a price increase, and other firms will raise their prices to the same level, avoiding direct price competition and maintaining higher prices across the industry.

#### **4. Types:**

**Barometric Price Leadership:** A firm known for its market acumen and ability to predict market conditions set the price.

**Dominant Price Leadership:** The largest or most influential firm in the market sets the price, and others follow to avoid competitive disadvantages.

### **19.5.5 Capacity and Output Management**

#### **1. Definition:**

Firms agree on capacity and output levels to control the supply in the market, thereby maintaining higher prices.

## **2. Mechanisms:**

**Capacity Limits:** Firms agree to limit their production capacity to prevent excess supply.

**Output Coordination:** Firms coordinate their production schedules to avoid market saturation and price declines.

## **3. Example:**

In the aluminum industry, firms might agree to reduce capacity by shutting down older, less efficient plants to reduce supply and maintain higher prices.

## **4. Benefits:**

Capacity and output management can lead to more stable prices and higher profit margins for firms, as supply is controlled to meet demand.

## **19.5.6 Joint Ventures and Strategic Alliances**

### **1. Definition:**

Firms form joint ventures or strategic alliances to cooperate on specific projects or markets, reducing competition and sharing risks.

### **2. Mechanisms:**

**Collaborative Projects:** Firms collaborate on research and development, production, or marketing efforts.

**Market Sharing Agreements:** Firms agree to share certain markets or customer segments, reducing direct competition.

### **3. Example:**

Automobile manufacturers might form a joint venture to develop new technologies, such as electric vehicles, sharing the costs and benefits of innovation while reducing competition in this segment.

### **4. Benefits:**

Joint ventures and strategic alliances can lead to cost savings, shared expertise, and reduced competitive pressures, enhancing the profitability of participating firms.

### Check Your Progress

1. What is collusion? Distinguish between explicit and implicit collusion.

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2. What factors facilitate collusion among firms in an oligopoly?

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## 19.6 ECONOMIC AND LEGAL IMPLICATIONS

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Collusive behaviour in oligopolistic markets has profound economic and legal consequences. While such coordination may result in increased profits for participating firms, it often harms consumers and reduces overall market efficiency. Antitrust regulations and legal systems are vital in curbing and punishing such conduct. This section delves into the economic effects of collusion and the legal approaches used to combat it.

### 19.6.1 Economic Consequences

#### 1. Elevated Prices

**Consumer Impact:** When firms engage in collusion, it typically leads to price inflation. By agreeing to maintain prices above the level that would prevail under competition, consumers are forced to pay more for goods and services. This erodes consumer surplus, potentially diminishing buying power and lowering living standards.

**Example:** In the early 2000s, multiple companies in the vitamin sector conspired to set prices, resulting in inflated costs for both individual consumers and industries that depended on these products.

#### 2. Reduced Output:

**Market Efficiency:** Collusion frequently results in lower production levels, as firms intentionally restrict output to sustain higher prices. This leads to allocative inefficiency, where the quantity of goods supplied



falls below the optimal level for society, causing a deadweight loss in the market.

**Example:** OPEC's production quotas for oil result in reduced global oil supply, maintaining higher prices but limiting the overall availability of oil.

### 3. Suppressed Innovation

**Reduced Incentives:** In collusive environments, companies often lack the motivation to innovate or enhance their products, as the absence of competitive pressure reduces the need for improvement. This can hinder technological progress and result in stagnation in product development.

**Example:** In sectors like construction, where collusion occurs, the lack of competition may lead firms to rely on outdated practices and technologies, thereby lowering overall industry productivity.

### 4. Inefficient Resource Allocation

**Misallocation of Resources:** Collusion disrupts the natural allocation of resources by diverting them away from their most efficient uses. Instead of responding to consumer demand and market signals, firms prioritize maintaining the terms of their collusive arrangements.

**Example:** In the agricultural sector, agreements to limit production through quotas can result in underutilization of farmland and other inputs, creating inefficiencies compared to a competitive market where output aligns with demand.

### 5. Wealth Transfer:

**From Consumers to Firms:** Collusion results in a wealth transfer from consumers to firms. The higher prices paid by consumers translate into higher profits for the colluding firms, exacerbating income inequality.

**Example:** The European Commission fined several major truck manufacturers for colluding to fix prices, resulting in overcharges for businesses and consumers who relied on these trucks for transportation.

## **19.6.2 Legal Implications**

### **1. Antitrust Laws:**

#### **Purpose and Implementation of Antitrust Laws**

**Objective:** Antitrust regulations aim to encourage healthy competition and eliminate practices that hinder market fairness, such as collusion. These laws outlaw agreements that suppress competition and grant authorities the power to investigate and penalize firms involved in such unlawful activities.

**Example:** The Sherman Antitrust Act in the U.S. serves as a key legal tool against monopolistic and cartel behavior. It has been instrumental in dismantling large-scale collusive setups—most notably the breakup of AT&T in the 1980s.

### **2. Role of Regulatory Authorities**

**Enforcement Responsibilities:** Specialized agencies, including the Federal Trade Commission (FTC) in the United States and the European Commission in the European Union, are responsible for monitoring market behavior and ensuring compliance with antitrust laws. These bodies play a central role in detecting and addressing anti-competitive conduct. These agencies conduct investigations, prosecute violators, and impose fines and other penalties to deter collusion.

**Example:** The European Commission's Competition Directorate-General has investigated and fined numerous cartels, including those in the automotive, electronics, and banking sectors.

### **3. Penalties for Collusion:**

**Fines and Legal Costs:** Companies proven to have participated in collusive arrangements may be subjected to heavy monetary penalties, including fines, litigation expenses, and compensation payouts. These financial consequences serve both as a deterrent against future collusion and as a means to provide restitution to parties negatively impacted by such anti-competitive conduct.

**Example:** In 2019, the European Commission fined several banks over €1 billion for colluding to manipulate foreign exchange rates, sending a strong signal against anti-competitive behaviour.

#### **4. Criminal Prosecution:**

**Individual Accountability:** In some jurisdictions, individuals involved in collusive activities, such as executives and managers, can face criminal charges, including imprisonment. This personal accountability enhances the deterrent effect of antitrust laws.

**Example:** The U.S. Department of Justice has prosecuted and imprisoned executives involved in price-fixing and bid-rigging schemes, highlighting the severe personal consequences of engaging in collusion.

#### **5. Leniency Programs:**

**Encouraging Whistleblowing:** Many regulatory agencies offer leniency programs to encourage firms and individuals to report collusive behavior. Those who come forward and cooperate with investigations may receive reduced penalties, fostering an environment where collusion is less likely to be sustained.

**Example:** The European Commission's leniency program has led to the uncovering of several major cartels, as firms seek to avoid hefty fines by cooperating with authorities.

#### **6. Ongoing Monitoring and Compliance:**

**Preventive Measures:** Regulatory bodies often implement ongoing monitoring and compliance programs to prevent collusion. These programs include market surveillance, compliance audits, and mandatory reporting requirements to ensure firms adhere to competitive practices.

**Example:** The FTC conducts regular audits and monitors industry practices to detect and prevent anti-competitive behavior, ensuring markets remain competitive and fair.

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## 19.7 SUMMARY

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Collusive oligopoly represents a market structure where a few firms engage in cooperative strategies to maximize joint profits by reducing competition through price setting, output restrictions, and market sharing. This unit has elucidated the types of collusion—explicit, like cartels and price-fixing, and implicit, such as tacit collusion—highlighting the conditions under which firms are likely to collude. Key factors that promote collusion include a small number of firms, product homogeneity, high market transparency, stable demand, and significant entry barriers. The unit also discussed various strategies employed in collusive oligopoly, such as price leadership, where one firm sets the price for others to follow, and market sharing, where firms agree to divide the market to avoid direct competition. Output and capacity management strategies are also common, ensuring firms maintain high prices by controlling production levels. The economic implications of collusion generally include higher prices, reduced output, and decreased consumer welfare, as competition is stifled. Legally, collusion is prohibited in many jurisdictions due to its detrimental effects on market efficiency and consumer rights, with regulatory bodies like the FTC and the European Commission actively enforcing antitrust laws. Real-world instances such as OPEC's influence on global oil pricing and the lysine price-fixing conspiracy highlight how widespread and impactful collusive practices can be. This unit emphasizes the need to comprehend collusion tactics within oligopolistic markets to encourage healthy competition and safeguard consumer welfare. At the same time, it draws attention to the complexities involved in identifying and curbing such anti-competitive behaviour.

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## 19.8 GLOSSARY

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- **Oligopoly:** A market structure in which a few firms dominate, with each firm's decisions influencing the others.
- **Collusion:** A cooperative arrangement between firms, typically aimed at controlling prices or production levels to enhance collective profits while reducing competition.
- **Cartel:** A structured alliance of producers that coordinate pricing and output strategies to maximize overall profits, often in violation of antitrust regulations.
- **Price Fixing:** A deliberate agreement among businesses to establish product prices at a fixed level instead of allowing market forces to determine them.
- **Tacit Collusion:** An unspoken, informal understanding among firms to avoid competitive practices like price wars, often achieved through signaling and mutual recognition.
- **Price Leadership:** A strategy where one dominant firm sets the price for a product, and other firms in the market follow suit, reducing the likelihood of price competition.
- **Market Sharing:** An agreement among firms to divide the market among themselves, either geographically or by customer type, to avoid direct competition.
- **Production Quotas:** Limits set by firms in a collusive agreement on the amount each firm can produce to control market supply and maintain higher prices.
- **Entry Barriers:** Factors that prevent new firms from entering a market easily, such as high startup costs, strong brand identity of existing firms, or regulatory hurdles.
- **Marginal Revenue:** The additional revenue that a firm gains from selling one more unit of a product, which is crucial in determining optimal output levels.

- **Marginal Cost:** The cost of producing one more unit of a product, a key factor in firms' production decisions to maximize profit.
- **Antitrust Laws:** Regulations designed to promote competition and prevent monopolistic practices and collusion among firms.
- **Federal Trade Commission (FTC):** A U.S. government agency responsible for enforcing antitrust laws and promoting consumer protection.
- **European Commission:** The executive body of the European Union, which also enforces competition laws and investigates anti-competitive practices.
- **Market Transparency:** The extent to which information about prices, output, and other market factors is available to all participants, influencing the ability to collude.

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## 19.9 EXERCISES

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1. Define and distinguish between explicit and implicit collusion in oligopolistic markets. Provide examples of each type.  
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2. What are the main factors that facilitate collusion among firms in an oligopoly?  
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3. Explain the concept of price leadership and its role in tacit collusion. How does it differ from explicit price-fixing agreements?

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4. Discuss the economic implications of collusion on consumer welfare and market efficiency.

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5. Describe the role of antitrust laws in preventing collusion and promoting competition. Provide examples of regulatory actions against collusive practices.

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## 19.10 SUGGESTED READINGS

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- Carlton, D. W., & Perloff, J. M. (2015). Modern Industrial Organization (4th ed.). Pearson.
- Tirole, J. (1988). The Theory of Industrial Organization. MIT Press.
- Stigler, G. J. (1964). A Theory of Oligopoly. Journal of Political Economy, 72(1), 44-61.
- Porter, R. H. (1983). A Study of Cartel Stability: The Joint Executive Committee, 1880-1886. Bell Journal of Economics, 14(2), 301-314.
- Federal Trade Commission (FTC). (n.d.). Antitrust Laws. Retrieved from <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws>
- European Commission. (n.d.). Cartels. Retrieved from [https://ec.europa.eu/competition/cartels/overview/index\\_en.htm](https://ec.europa.eu/competition/cartels/overview/index_en.htm)

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## **UNIT 20: PRICE LEADERSHIP STRATEGIES IN OLIGOPOLY**

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### **STRUCTURE**

- 20.1 Introduction
- 20.2 Objectives
- 20.3 Concept of Price Leadership
- 20.4 Types of Price Leadership
  - 20.4.1 Barometric Price Leadership
  - 20.4.2 Dominant Price Leadership:
  - 20.4.3 Collusive Price Leadership:
- 20.5 Factors that enable price leadership
- 20.6 Advantages and Disadvantages of Price Leadership
- 20.7 Summary
- 20.8 Glossary
- 20.9 Exercises
- 20.10 Suggested Readings

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### **20.1 INTRODUCTION**

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In oligopolistic markets, where a few dominant firms significantly influence pricing and market dynamics, price leadership plays a crucial role. This strategy occurs when a leading firm sets the price for a product or service, prompting other firms to follow. It helps maintain price stability, minimize aggressive competition, and sustain profitability within the industry. Unit 20 explores the nuances of price leadership, including its different types such as barometric, dominant, and collusive price leadership. By examining these strategies, students gain a deeper understanding of how firms shape market trends using cost advantages, market influence, and strategic planning. The unit also analyzes the economic effects of price leadership, including its influence on market efficiency, consumer welfare, and entry barriers for new firms. Furthermore, it discusses the regulatory and legal aspects that govern

price-setting practices in oligopolistic markets, ensuring fair competition and consumer protection.

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## **20.2 OBJECTIVES**

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By the end of this unit, students will be able to:

1. Understand the concept of price leadership in oligopolistic markets.
2. Identify and differentiate between various types of price leadership strategies.
3. Analyze the conditions that facilitate the emergence of price leadership.
4. Evaluate the economic implications of price leadership on market competition and consumer welfare.
5. Assess the regulatory and legal aspects related to price leadership.



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## 20.3 CONCEPT OF PRICE LEADERSHIP

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**Fig.20.1 Price Leadership**

**Price leadership** occurs when a dominant firm within a market referred to as the "leader" sets the price for a product or initiates price changes, which are then followed by other firms, known as "followers," who adopt similar pricing strategies. Seaton and Waterson (2013) provide a more refined and testable definition of this phenomenon: price leadership takes place when one firm alters the price of a product, and within a short timeframe, another firm mirrors the change in the same direction and on the same product, doing so more frequently than would be expected by random chance.

This concept reflects **strategic interdependence** in oligopolistic markets, where each firm recognizes that its pricing decisions will influence, and be influenced by, the actions of its competitors. In such markets, there is often a concern that firms may, through repeated interaction, recognize mutual benefits in maintaining higher prices effectively reducing competition and harming consumers. This scenario is known as **tacit collusion** or **conscious parallelism**, where firms coordinate behavior without any direct communication or formal agreement.

One common method of tacit coordination is the emergence of a price leader, typically the largest or most influential firm, while other companies act as followers. When the leader raises its prices, followers tend to do the same, assuming it is more profitable to align with the leader than to undercut them. In essence, the leader sets a pricing trend that lifts all firms' prices, metaphorically raising all boats with the tide.

Price leadership may serve either as a mechanism for tacit coordination or as an indicator of such behaviour. However, in the absence of clear evidence of direct communication or agreement, distinguishing between potentially harmful leader-follower dynamics and ordinary competitive behaviour becomes complex. For example, several firms may raise their prices around the same time, but this could simply be a response to a common increase in production costs rather than an indication of collusion.

Therefore, any comprehensive theory that aims to demonstrate consumer harm based on observable price leadership must be equipped to address several critical and nuanced questions.

- What strategic or economic advantages might a firm obtain by assuming the role of a price leader rather than that of a follower?
- How can other businesses determine the identity of the leader?
- What is the motivation for other enterprises to emulate the leader?

Ultimately, a firm that takes on the role of a price leader faces the risk of being challenged by rivals who choose not to follow its pricing cues. This raises an important question: if being a leader yields greater financial benefits, what incentive would any firm have to remain a follower? It becomes essential to explain why and how price leadership might take the place of conventional market competition.

Extensive economic research has explored these issues, particularly the broader circumstances under which such coordinated pricing behaviour tends to emerge. A key insight from this body of work is that firms engaged in coordinated strategies must be capable of detecting and responding to deviations—often by implementing punitive measures like initiating a price war. When the costs of such retaliation are high enough, other firms are more likely to comply with the leader's pricing strategy rather than disrupt it, allowing price leadership to replace standard competitive dynamics.

Moreover, economic theory has explored various forms of strategic interdependence and leader-follower relationships that can result in prices exceeding those found in competitive markets, even if they do not fit the strict definition of price leadership. For example, a leading firm might overinvest in its own capacity to gain a strategic edge, while simultaneously discouraging rivals from building up their capabilities. Such behaviour can intentionally intensify resource scarcity, ultimately pushing market prices higher.

### **Here are some examples of Price Leadership**

Some concrete instances of pricing leadership in the actual world.

#### ***1. Delta Air Lines:***

As of 2023, Delta Airlines, an American carrier, had the second largest market share of 17.2% in the air travel industry. Leveraging its dominant market position, it strategically utilizes its leadership approach for its benefit.

During periods of high travel demand, such as the summer season, the airline increases ticket rates in order to maximize revenue and profit margins. This strategy targets consumers who value convenience and dependability more than cost. In contrast, when there is a decrease in demand, Delta proactively adjusts their maximum pricing to a lower

level in order to appeal to clients who are sensitive to price. This helps Delta maintain high occupancy rates on its flights and gain an advantage over its rivals.

## 2 Apple:

The pricing leadership of Apple has a substantial influence on the whole consumer electronics market. Apple's introduction of a new product at a high price point often establishes a standard that rivals strive to meet. Consequently, Competing firms in the market are often driven to adopt similar pricing strategies for their products.

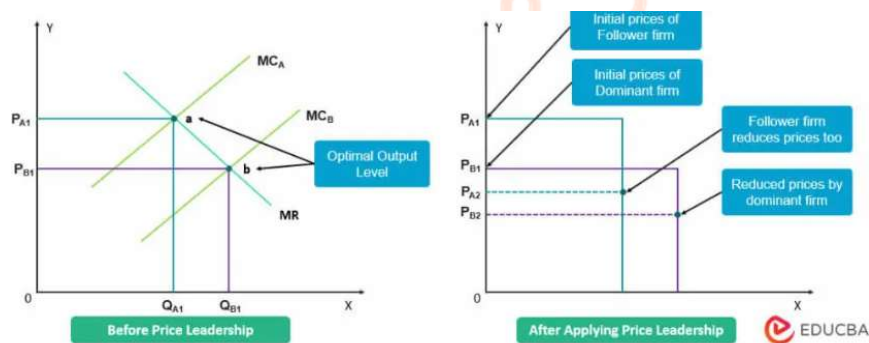


**Fig.20.2 The price leadership Model**

The price leadership graph illustrates the optimal production level for each business, where their marginal cost and marginal income coincide. This level guarantees substantial earnings for the companies. The ideal production level of the dominant business is often lower than that of the follower firm. It signifies their capacity to make more revenues despite producing goods at a reduced cost. It should be noted that in some cases, the dominant business may have a greater level of output compared to the follower firm. This is influenced by variables such as production capacity, cost structures, and demand levels.



## 20.4 TYPES OF PRICE LEADERSHIP

The three main types of price leadership are barometric, collusive, and dominating.

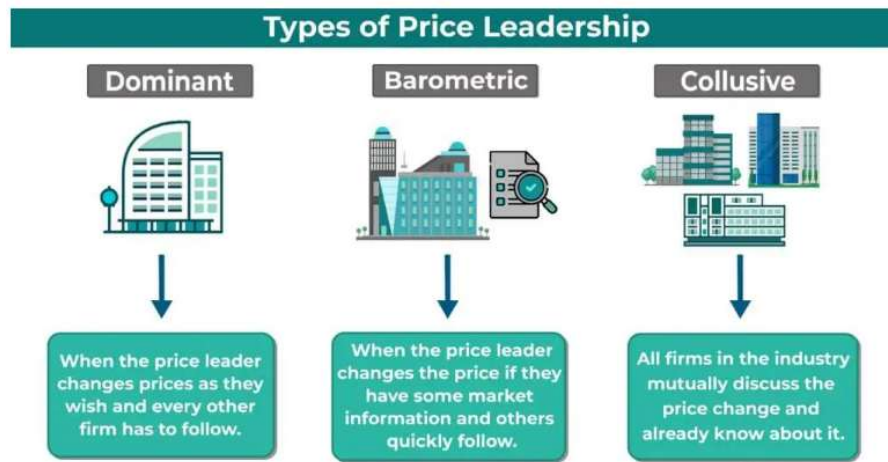


Fig.20.2 Types of Price Leadership

### 20.4.1 Barometric Price Leadership

The barometer price leadership concept refers to a situation when a certain business has superior skills in detecting changes in relevant market variables, such as fluctuations in manufacturing costs. This enables the company to react to market dynamics with greater efficiency. For example, the company may begin a modification in pricing.

A business with a modest market share might serve as a barometric price leader if it excels in production and is sensitive to market developments. Other producers may emulate its actions, supposing that the price leader has knowledge that they have not yet grasped. Nevertheless, because to the limited authority of a barometer leader in enforcing its judgements on other companies within the sector, its leadership may be of short duration.

**Definition:** Barometric price leadership occurs when a firm, typically the one best at predicting market conditions, sets the price that other firms in the industry then follow.

**Example:** In the airline industry, a leading carrier might adjust its ticket prices in response to changes in fuel costs or seasonal demand patterns. Competing airlines then use these price changes as signals to adjust their own fares.

**Implications:** Barometric price leadership helps maintain stability in pricing by leveraging superior market information. However, it can lead to a reactive pricing strategy among follower firms, potentially reducing their ability to differentiate based on price.

#### **20.4.2 Dominant Price Leadership:**

In the dominant pricing leadership model, a single business has a significant majority of the market share in its sector. In the industry, there are minor enterprises that provide same goods or services as the dominant corporation. Nevertheless, under this paradigm, these relatively smaller enterprises lack the ability to have any impact over pricing.

A dominating pricing leadership approach is also called a kind of limited monopoly. In this approach, the price leader may use predatory pricing, which involves reducing prices to a level that renders it unfeasible for smaller, rival enterprises to sustain their operations. Predatory pricing, which involves intentionally lowering prices to harm smaller enterprises, is banned in most nations.

**Definition:** Collusive price leadership occurs when firms within an oligopoly explicitly or tacitly agree to coordinate their pricing strategies under a formal or informal understanding.

**Mechanism:** Firms may engage in overt agreements, such as price-fixing cartels, or implicit coordination where pricing behaviours align without explicit communication. Collusion aims to stabilize prices and maintain profit margins for all participating firms.

**Example:** In the oil industry, OPEC (Organization of the Petroleum Exporting Countries) members sometimes coordinate production levels to influence global oil prices, demonstrating a form of collusive price leadership.

**Implications:** Collusive price leadership raises significant legal and ethical concerns, as it can harm consumer welfare by artificially inflating prices and limiting market competition. Regulatory bodies enforce antitrust laws to prevent and penalize such collusive behaviours.

#### **20.4.3 Collusive Price Leadership:**

The collusive pricing leadership paradigm may arise in marketplaces characterised by oligopolistic circumstances. Collusive pricing leadership arises when a small group of dominating enterprises reach an explicit or tacit agreement to maintain their prices in mutual alignment. Smaller enterprises in the market are compelled to conform to the price adjustment introduced by the larger firms. This strategy is mostly prevalent in businesses characterized by significant barriers to entry and well-established manufacturing costs.

These agreements between corporations, whether they are explicitly stated or implied, might be deemed unlawful if their purpose is to deceive the public. The distinction between price leadership and criminal collaboration is subtle. If the fluctuations in the price of a product are not linked to the variations in the firm's operational expenses, price leadership is more likely to be seen as collusive, and possibly unlawful.

**Definition:** Collusive price leadership occurs when firms within an oligopoly explicitly or tacitly agree to coordinate their pricing strategies under a formal or informal understanding.

**Mechanism:** Firms may engage in overt agreements, such as price-fixing cartels, or implicit coordination where pricing behaviors align without explicit communication. Collusion aims to stabilize prices and maintain profit margins for all participating firms.

**Example:** In the oil industry, OPEC (Organization of the Petroleum Exporting Countries) members sometimes coordinate production levels to influence global oil prices, demonstrating a form of collusive price leadership.

**Implications:** Collusive price leadership raises significant legal and ethical concerns, as it can harm consumer welfare by artificially inflating prices and limiting market competition. Regulatory bodies enforce antitrust laws to prevent and penalize such collusive behaviours.

#### **Economic and Strategic Considerations**

**Market Stability:** Price leadership strategies, regardless of type, often contribute to price stability by reducing volatility and uncertainty in markets.

**Competitive Dynamics:** Follower firms in price leadership scenarios must balance responding to leader pricing without sacrificing their competitive positions or profitability.

**Regulatory Oversight:** Antitrust laws and regulatory bodies play a critical role in monitoring and enforcing fair competition, particularly in cases of collusive price leadership that may harm market efficiency and consumer welfare.

Understanding the nuances of these types of price leadership provides valuable insights into how firms strategically navigate oligopolistic markets, balancing competitive pressures with the need for sustainable profitability and compliance with regulatory frameworks.

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## **20.5 FACTORS THAT ENABLE PRICE LEADERSHIP**

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Several causes motivate corporations to assume the role of price leaders in different industries:

#### **Limited access to the market (Restricted market entry):**

Companies may readily establish and sustain their positions as price leaders in sectors characterised by limited entry. New competitors may find it difficult to enter a sector due to the presence of necessary licenses, specialisations, or prohibitions. Given these conditions, a select few dominant corporations may exert substantial influence over the market and assume the role of price leaders. Industries such as media, medicine, and airline have limited market entrance.

**Significant portion of the market:**

Price leaders in industries often dominate a significant portion of the market share in order to create their competitive edge. Industries characterised by a small number of enterprises that divide the market share among themselves operate under an oligopolistic market structure. Price leaders are more likely to emerge in sectors with a limited number of rivals. Communications and media corporations often target a significant portion of the market. In light of the variety of marketplaces, corporations consistently strive to carve out specific market segments and provide customers with the most competitive pricing.

**Similar long-run average costs:**

In industries whose manufacturing processes have identical long-run average costs, price leaders may emerge effortlessly. The closeness in cost facilitates enterprises to engage in competitive pricing. Furthermore, it fosters innovation by maintaining a somewhat equitable distribution of production expenses. The airline business serves as a prime example, since ticket rates see relatively minor fluctuations owing to similarities in operational expenses.

**Distinctive implementation:**

Typically, companies operating in the same industry tend to have comparable expenses in their manufacturing operations. This resemblance provides a corporation with prospects to differentiate itself. A firm may increase the pricing of its goods by implementing a distinctive product model, providing dynamic services, or investing in superior product quality. These enhancements might be an appealing factor for several clients seeking high-quality items or specialised services in a certain market segment.

**Innovative:**

Innovation leaders may also serve as price leaders. The capacity of a corporation to identify and exploit trends may distinguish it from rivals and provide exclusive influence over pricing. A price leader might exert

its influence by increasing or decreasing prices in response to an anticipated market need or shift in demand. Companies may enhance their profitability by detecting trends and can also create the benchmark for others to follow by creating these trends.

**Inelastic demand:**

Inelastic demand is characterised by a consistent and unchanging amount of demand within an industry. In situations when this phenomenon occurs, corporations have the opportunity to establish themselves as dominant players in terms of pricing, since there is a consistent level of demand that persists despite external influences. For example, a firm operating in the water bottling sector serves the unchanging need for regular consumption of bottled water and may use this stability to establish its pricing strategy.

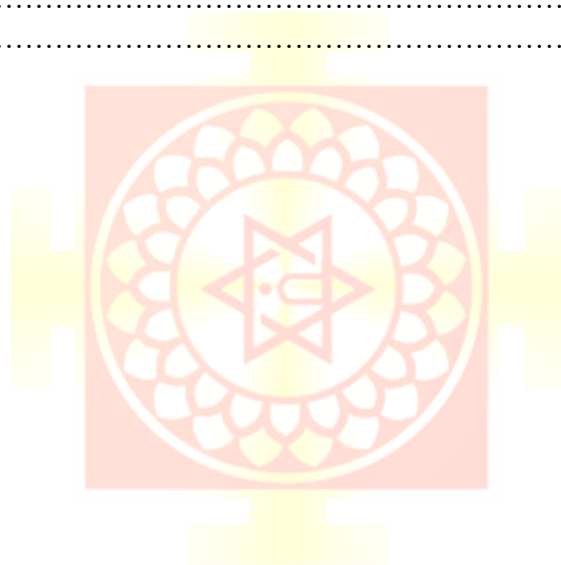
**Check Your Progress**

1. What is price leadership? Explain its major types.

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2. What conditions facilitate the emergence of price leadership in oligopolistic markets?

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## 20.6 ADVANTAGES AND DISADVANTAGES OF PRICE LEADERSHIP

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There are several potential benefits for companies who establish themselves as pricing leaders in an industry. Occasionally, other companies in the same sector may also gain advantages from the rise of a dominant company that sets the pricing. For instance, if enterprises in a certain market emulate a price leader by establishing elevated pricing, then all producers in that market have the potential to gain financially, as long as demand stays stable.

Price leadership has the capacity to eradicate or diminish price wars. In a market when all firms are of equal size and there is no dominant price leader, price wars may occur as each rival strives to get a larger portion of the market.

An outcome of price leadership is the potential for improved product quality due to increased earnings. Higher earnings often result in increased income for firms, enabling them to allocate more resources to research and development (R&D). Consequently, this enhances their capacity to innovate and create novel goods, ultimately providing greater value to consumers.

Price leadership dynamics may foster interdependence rather than competitiveness. When businesses operating in the same market choose for a parallel pricing strategy, rather than engaging in price competition, it creates a favorable atmosphere that promotes growth for all enterprises involved.

The establishment of price leadership within an industry may also have several potential drawbacks. Price leadership often confers advantages to firms, particularly in terms of their profitability and performance. Price leadership, characterised by price increases, does not provide any tangible benefits to customers. However, if the price leader decides to



cut prices, consumers may enjoy the advantage of more affordable products and services.

In all price leadership models, including barometric, collusive, and dominating, it is the sellers that gain from higher profits, while the consumers do not benefit. Customers will be required to pay a higher price for things that they were used to purchasing at a lower cost due to the collusion of merchants to increase pricing.

In the near term, consumers may experience advantages if a dominant company reduces prices and becomes a price leader. This presupposes that the price leader is not engaging in predatory pricing tactics to eliminate competitors who are unable to retaliate, and then exerting monopolistic power to increase prices.

Price leadership may also be inequitable for smaller enterprises, since they may lack the same economies of scale as the leaders when trying to match their pricing. This may impede their ability to maintain a steady decrease in prices (and, ultimately, to be operational in the long run). Price leadership may also lead to unethical behaviour by rival enterprises who choose not to adhere to the pricing set by the leader. Alternatively, companies could use assertive marketing tactics, such as offering discounts, refund guarantees, complimentary shipping, and installment-based payment options.

In a price leadership model, there is an unavoidable disparity between the advantages gained by the price leader and the benefits received by other enterprises in the same sector. For instance, if the price leader incurs cheaper production expenses for the same product compared to another business, the leader would establish lower pricing. Any business with greater expenses than the price leader will experience a loss as a consequence.

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## 20.7 SUMMARY

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Unit 20: Price Leadership Strategies in Oligopoly has provided a comprehensive exploration of how dominant firms in oligopolistic markets strategically set prices to influence industry dynamics. We began by defining price leadership as a strategy where one firm establishes the price, guiding others to follow suit to maintain stability and avoid destructive price wars. The unit detailed various types of price leadership, including barometric, dominant, and collusive, each characterized by distinct mechanisms and implications for market behavior. We analyzed the conditions facilitating price leadership, such as market structure, product homogeneity, and cost structures, highlighting their role in shaping competitive strategies. Economic implications were thoroughly examined, revealing how price leadership impacts market stability, consumer welfare, and innovation incentives, while also creating barriers to entry for new firms. Legal and regulatory aspects were crucially discussed, emphasizing the role of antitrust laws and enforcement agencies in curbing anti-competitive practices and ensuring fair market conduct. By understanding these dynamics, students have gained insights into the complex interplay between strategic pricing, market structure, and regulatory oversight in oligopolistic environments, preparing them to critically analyze and navigate real-world economic scenarios.



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## 20.8 GLOSSARY

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- **Oligopoly:** A market structure characterized by a small number of firms that dominate the market.
- **Price Leadership:** A strategy where one firm sets the price, and other firms follow.
- **Barometric Price Leadership:** Price leadership based on the firm best predicting market conditions.
- **Dominant Price Leadership:** Price leadership by the firm with the largest market share or lowest cost.
- **Collusive Price Leadership:** Price leadership involving explicit or implicit agreements among firms.
- **Consumer Surplus:** The difference between what consumers are willing to pay and what they actually pay.
- **Allocative Inefficiency:** A situation where resources are not allocated optimally, leading to a loss of economic welfare.
- **Antitrust Laws:** Regulations that promote competition and prevent anti-competitive practices.
- **Federal Trade Commission (FTC):** A U.S. regulatory body that enforces antitrust laws.
- **Sherman Antitrust Act:** A U.S. law prohibiting monopolistic practices and cartels.
- **Market Transparency:** The availability of market information to all participants.
- **Cost Structure:** The composition of a firm's costs, including fixed and variable costs.
- **Barriers to Entry:** Obstacles that make it difficult for new firms to enter a market.
- **Price Fixing:** An illegal agreement among firms to set prices at a certain level.
- **Deadweight Loss:** A loss of economic efficiency that occurs when the equilibrium outcome is not achieved.

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## 20.9 EXERCISES

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1. Discuss the concept of price leadership and its various types with examples.

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2. Analyze the conditions that facilitate the emergence of price leadership in oligopolistic markets.

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3. Evaluate the economic implications of price leadership on market competition and consumer welfare.

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4. Explain the regulatory and legal aspects of price leadership, citing relevant examples and 'cases.

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5. Discuss strategies that firms can use to achieve and maintain price leadership while avoiding legal issues.

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## 20.10 SUGGESTED READINGS

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1. Pindyck, R. S., & Rubinfeld, D. L. (2018). Microeconomics (9th ed.). Pearson.
2. Stiglitz, J. E., & Walsh, C. E. (2006). Economics (4th ed.). W.W. Norton & Company.
3. Carlton, D. W., & Perloff, J. M. (2015). Modern Industrial Organization (4th ed.). Pearson.
4. Church, J., & Ware, R. (2000). Industrial Organization: A Strategic Approach. McGraw-Hill.
5. Scherer, F. M., & Ross, D. (1990). Industrial Market Structure and Economic Performance (3rd ed.). Houghton Mifflin.
6. European Commission Competition Directorate-General. (n.d.). Cartels. Retrieved from [EC Cartels](#)
7. U.S. Department of Justice. (n.d.). Antitrust Division. Retrieved from DOJ Antitrust Division
8. <https://www.educba.com/price-leadership/>